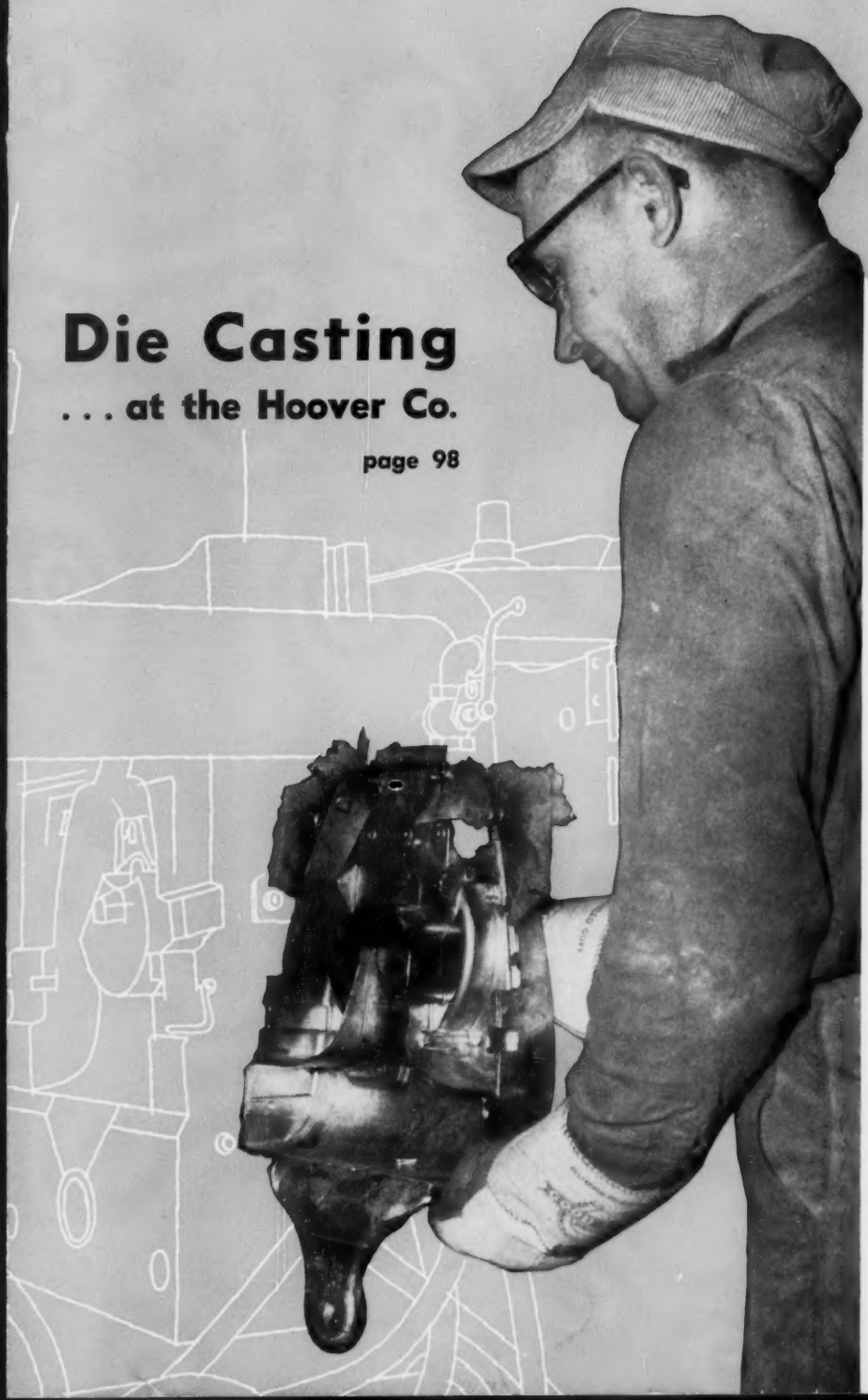
# FOUNDRY

JUNE 1957

A PENTON PUBLICATION



## Die Casting

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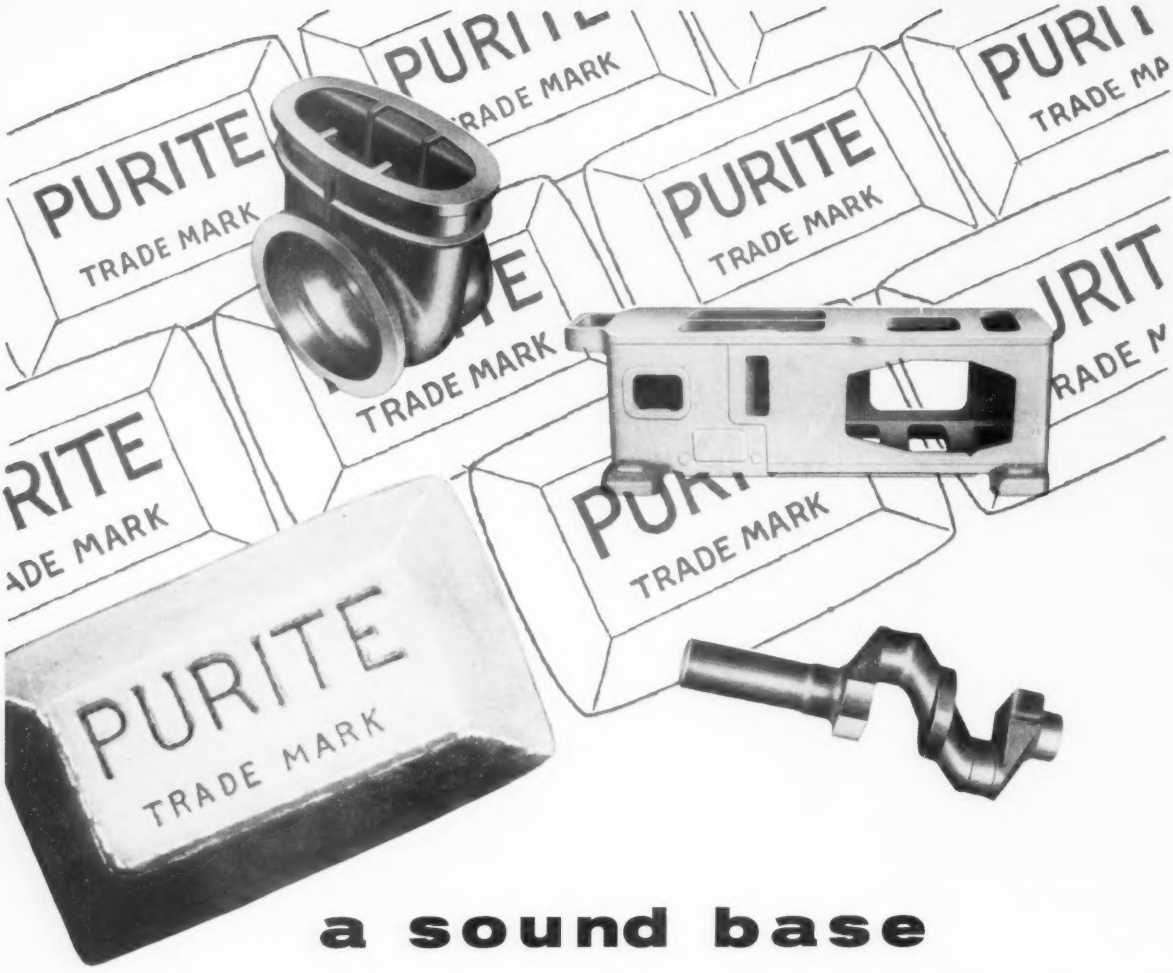


# a sound base for quality castings

**Assures smooth mixing and melting.** Purite flux in the cupola increases fluidity of the charge, speeds combustion reactions, and prevents bridging.

**Cures high-sulphur scrap.** In both cupola and ladle, Purite is an efficient desulphurizer producing clean, quiet-pouring iron of the desired sulphur specification.

**Convenient and economical.** Each Purite pig is two pounds of pure, non-crumbling fused soda ash. No inert waste or dust; no expensive equipment. Easily stored; easily used . . . you measure the amount you need by counting.

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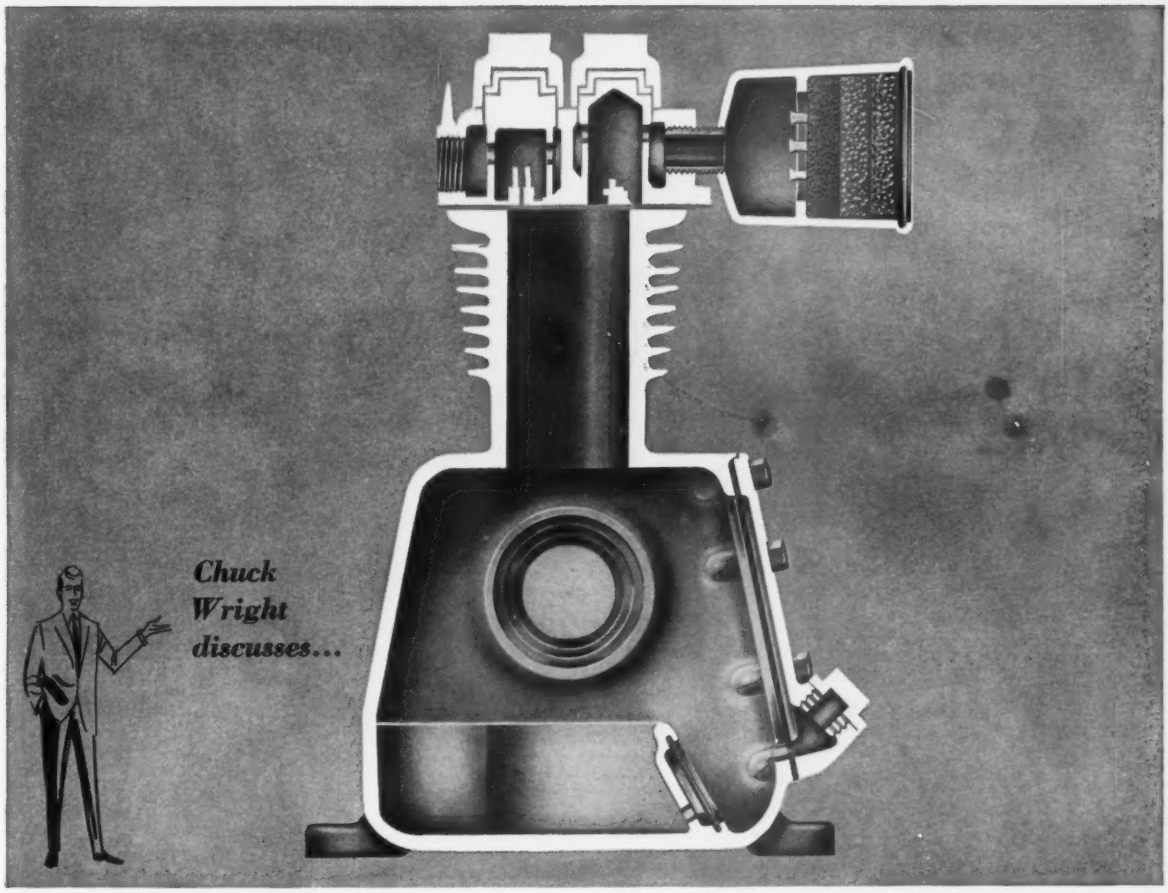


# Four ways nickel cast irons help your customers build better compressor cylinders

"Four properties—strength, pressure tightness, wear resistance and machinability—are uppermost in the minds of your customers when they buy compressor cylinder castings. Nickel cast irons best provide these properties.

"First, nickel cast irons have the strength levels needed for really efficient designs, designs that save on space and weight.

"Second, they promote uniform density in both thick and thin sections. This means sure-fire pressure tightness.

"Third, the addition of nickel to iron increases the hardenability, without danger of chilling the thinner sections. This gives your customer a more wear resistant cylinder.

"Fourth, nickel cast irons are readily machinable making possible higher machining speeds and reduced tool wear.

"And what goes for compressor cylinders goes for valve bodies, pump casings, motor blocks and numerous other heavily-cored castings. Nickel cast irons provide the best combination of strength, pressure-tightness, wear resistance and machinability.

"A wide range of nickel cast iron compositions are available that do as much, and more, for other types of castings.

"For help in selecting the right nickel cast iron for your requirements, get in touch with me through The International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y."

Chuck Wright

Foundry Specialist

**Nickel Cast Irons:** ***Best for you because they're best for your customer***



Circle 554 on Inquiry Card—Page 51

If it's easier, better sand control you're after—here's the answer! These three materials, added in varying amounts to sand (dry or in slurry), will give you *close control* over green and dry strength and carbon content, and also provide GREATER FLOWABILITY and LESS LUMPY SHAKEOUT!

GREEN BOND Bentonite excels in developing and controlling green and dry strength. Its medium to low viscosity cuts down on mulling time and permits slurry users to add more bentonite per gallon of slurry, without strain on the pumping system. CROWN HILL Seacoal is exceptionally low in sulphur content, which means your castings will have more easily machined surfaces. Federal SAND STABILIZER improves the flowability of sand and eliminates lumps in sand shakeout. It burns out faster than any other facing material. Since it has a very low ash content and has no deteriorating effect on sand, you can re-use your molding sand *safely*.

And this is important—these advantages, plus many others, are yours at low cost. For these sand additives will actually cost you *less than $1.00 per ton of castings produced!* To learn more about them, write for your copy of *"Tailor-Made Molding Sands"*.

FEDERAL

The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET, CLEVELAND 5, OHIO

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FOUNDRY
A PENTON PUBLICATION

June 1957
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# HOW TO shed new light on your old sand problems

CALL ON YOUR ARCHER FIELD REPRESENTATIVE. PUT HIM TO WORK IN YOUR FOUNDRY. HE'S CLOSE BY READY TO HELP RELIEVE YOUR MOST PERPLEXING PROBLEMS INVOLVING SANDS AS THEY RELATE TO CASTING QUALITY AND ECONOMY.

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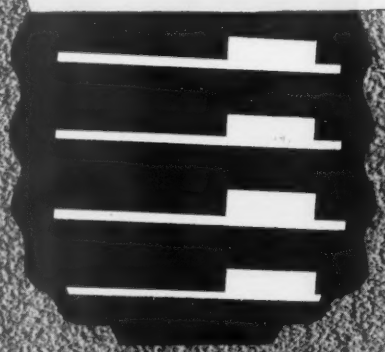

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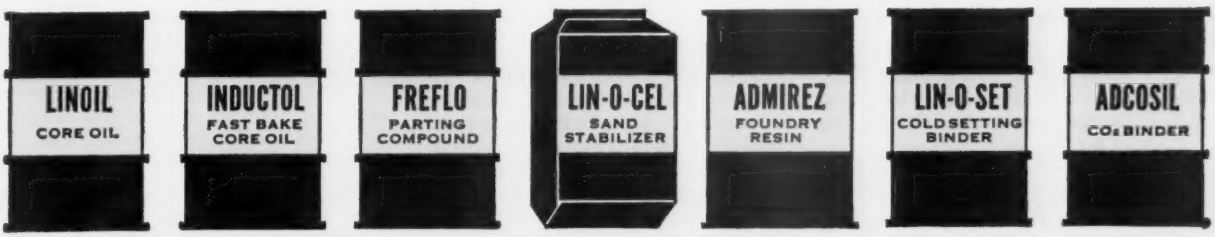
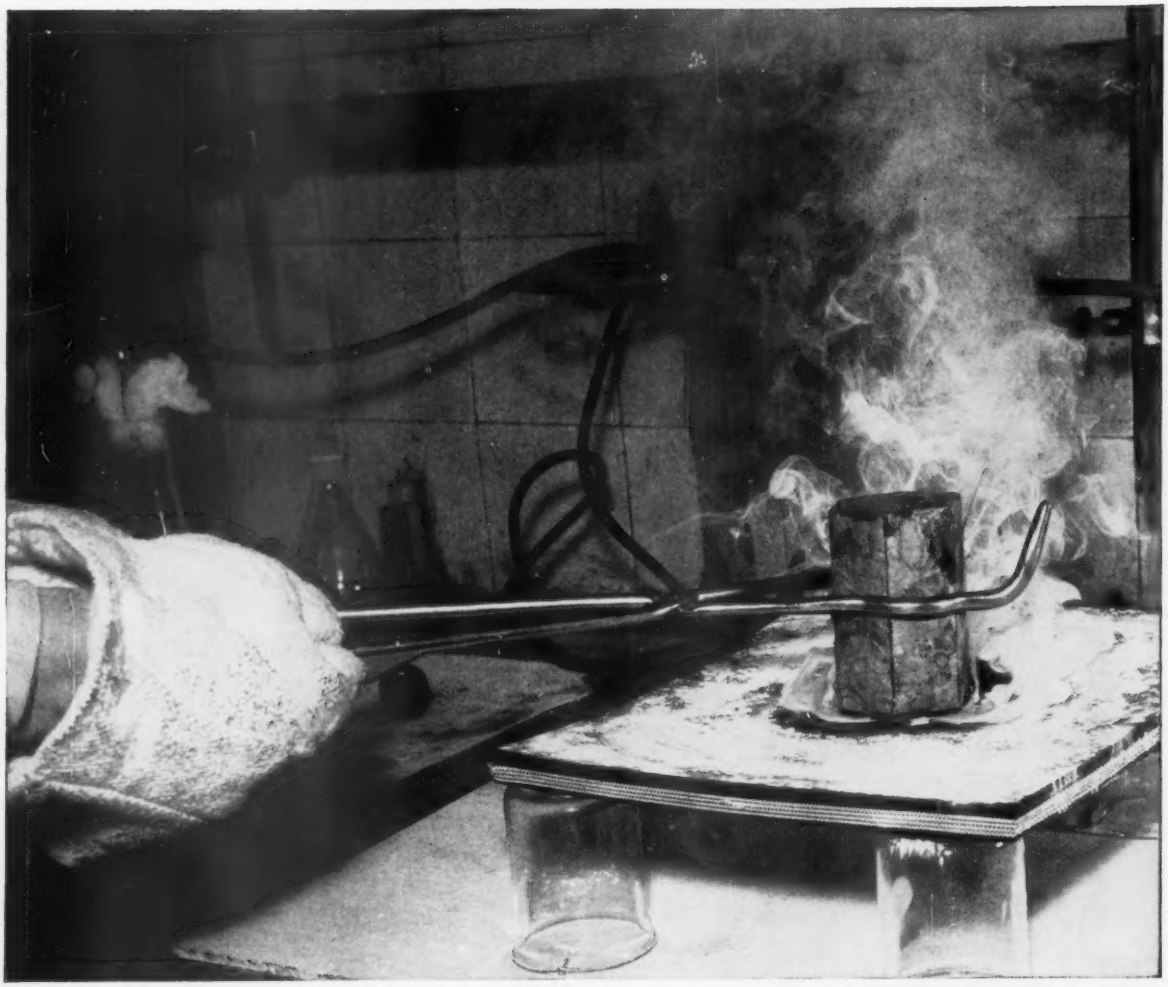



**Archer Daniels Midland company**

**FOUNDRY PRODUCTS DIVISION • 2191 WEST 110th ST., CLEVELAND 2, OHIO**

# B.F.Goodrich



# Red-hot metal won't burn through this B.F.Goodrich conveyor belt

*New fire curtain means longer life for hot-material belts*

SCORCHING chunks of metal that sometimes land on foundry conveyor belts won't burn holes through a B. F. Goodrich conveyor belt with the built-in fire curtain.

This new protective shield is two layers of glass fabric that B. F. Goodrich puts into the top cover of hot-material conveyor belts. If a hot chunk of metal accidentally drops on the belt, the rubber cover chars at the spot, but only down to the glass fabric fire curtain. Since the hot object doesn't penetrate the glass fabric barrier, the belt keeps its strength and so, of course, lasts longer than belts without this protection.

To demonstrate the effectiveness of the fire curtain, tests were run on two hot-material belts. One belt had the B. F. Goodrich fire curtain protection; the other did not. A red-hot steel bar was placed on each belt. It burned through the rubber covers on both belts. And it burned a hole clear through the unprotected belt. But the B. F. Goodrich fire curtain stopped the burning chunk, so that the body of the protected belt was undamaged.

The fire curtain protection is ideal for foundry service where burnt holes are the major cause of short belt life. It can be built into any B. F. Goodrich hot-material belt. Talk it over with a B. F. Goodrich distributor and see if this new belting improvement is the answer to your hot material problems. *B. F. Goodrich Industrial Products Company, Dept. M-960, Akron 18, Ohio.*

**B.F.Goodrich**

**INDUSTRIAL PRODUCTS**



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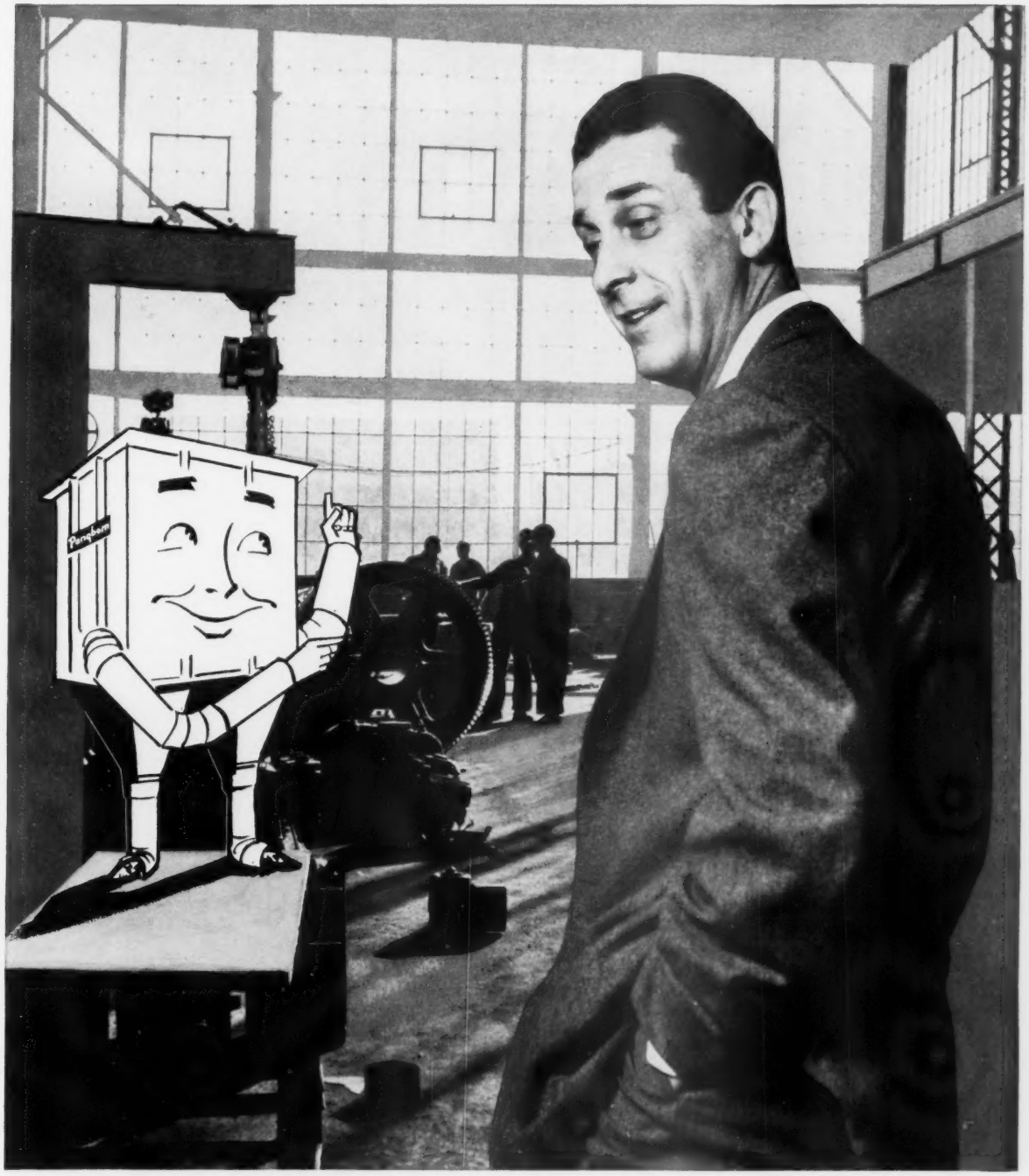



# "You're kidding! Cut housekeeping costs 20%?"

You heard right! Many firms have been getting 20% lower housekeeping costs after installing Pangborn Dust Control in their plants. That's because Pangborn Collectors trap dust controlled at the source . . . won't permit uncontrolled dust to settle on walls, floors, working surfaces. Of course, we can't promise *your* housekeeping costs will drop as much as 20%. But less painting, sweeping, washing can cut your overall maintenance costs 5%, 10%, 15% or even more.

What's more, Pangborn gives you other benefits of longer machinery life, higher employee efficiency, extra profits from any salvage value and better employee and community relations. And Pangborn offers a complete line of dust collectors for all jobs.

Discover how you can profit from Pangborn Dust Control! Write for Bulletin 922 to PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment.*

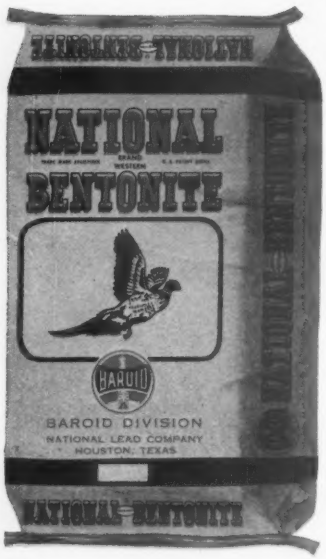
**Pangborn CONTROLS DUST**

**BAROID . . . now offers you . . . Improved**

# NATIONAL*

# Western Bentonite

**. . . in a NEW bag!**



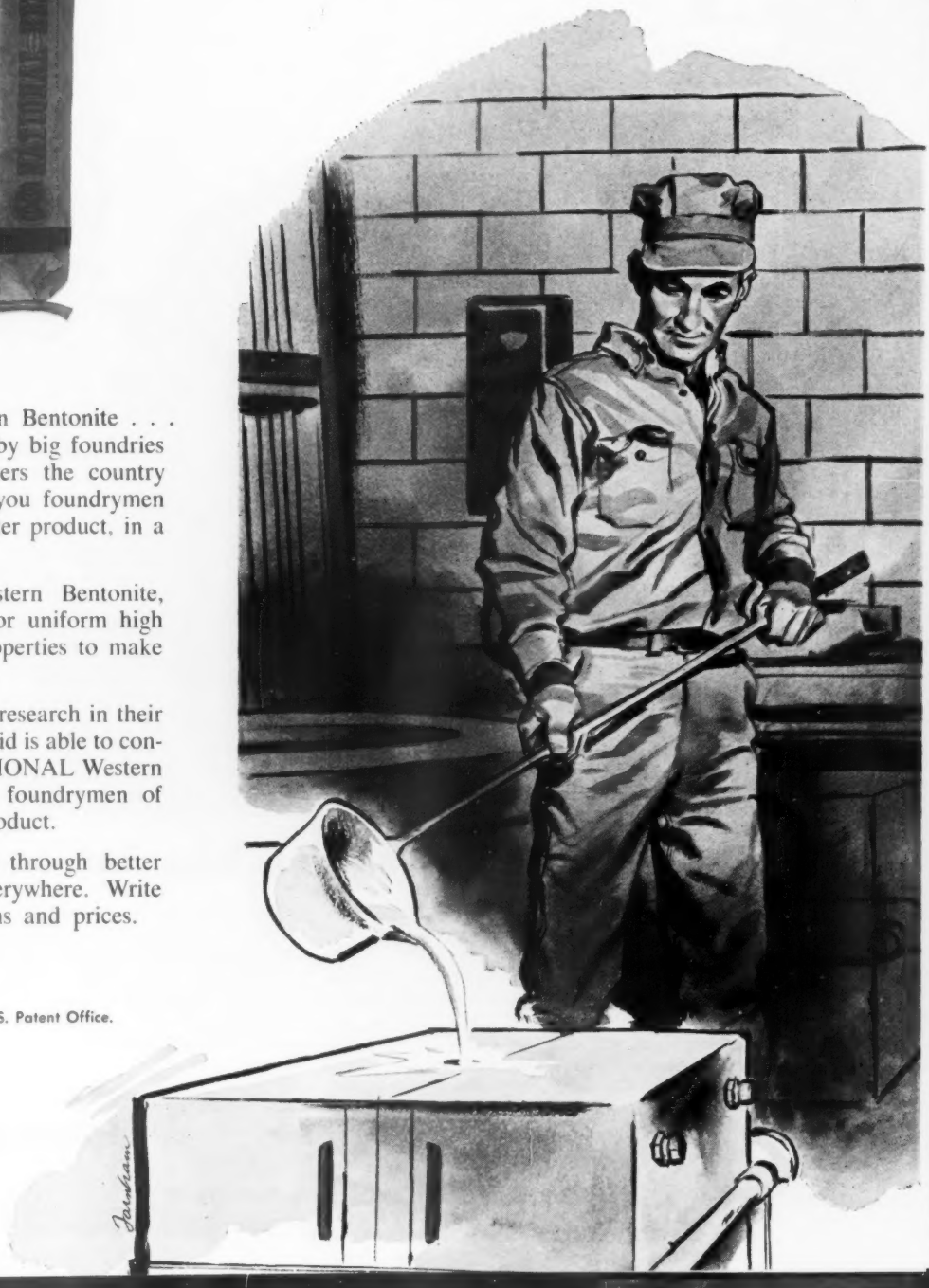

NATIONAL Western Bentonite . . . known and accepted by big foundries and big bentonite users the country over, now comes to you foundrymen . . . an improved, better product, in a *New Bag.*

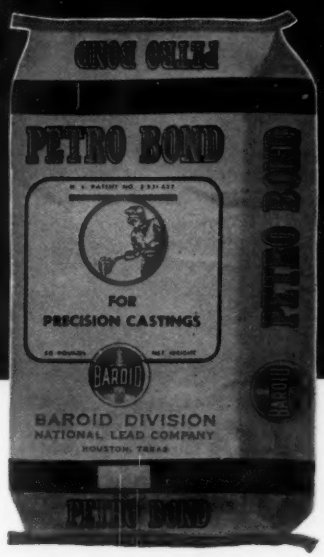
NATIONAL Western Bentonite, enjoys a reputation for uniform high quality and better properties to make good sand molds.

Through constant research in their own laboratories, Baroid is able to continually improve NATIONAL Western Bentonite and assure foundrymen of the highest quality product.

Available to you through better foundry suppliers everywhere. Write today for specifications and prices.

*Trademark Registered U. S. Patent Office.






new from . . . BAROID

# PETRO BOND

## Bonds Sand WITHOUT Water

**for . . . Precision Casting with Conventional Foundry Equipment**

MOLDING SANDS containing PETRO BOND as the bonding agent use oil instead of water. This permits the use of much finer sands with lower permeability than can be used with molding sands containing water—assuring *precision castings* — with all ordinary foundry equipment.

PETRO BOND by BAROID is a formulated bonding agent that bonds sand in the presence of oil. PETRO BOND allows the foundryman to bond sands *without* using *water*. Water has, heretofore, necessitated high permeability in ordinary molds to aid in venting gases.

Send today for your free copy of folder giving additional detailed information describing PETRO BOND.

BAROID

**BAROID DIVISION • NATIONAL LEAD CO.**
**332 South Michigan Avenue, Chicago 4, Illinois**

*Circle 559 on Inquiry Card—Page 51*

8722

**1500-lb. SHOCK LOADS HIT THIS IMPERIAL BELT**

Every 5 minutes, a 1500-lb. load of hot carbon pitch mix is dumped on this Imperial Standard Sahara Impregnation 935 Innerlocked Conveyor Belt. Temperatures of the mix are 285° to 300° F.

Since 1948 this belt (102' long by 30" wide x 6 ply) has been in operation 9 hours a day, 5 days a week in the Speer Carbon Co. plant, giving excellent service throughout its life.

**JOB-DESIGNED BELTING**

Imperial Belting lasts longer in severe service like this because of its INNERLOCKED* construction, an exclusive Imperial stitching process . . . and the special impregnating compounds developed by Imperial.

Imperial Belts are job-designed to give you lowest ultimate belt cost and highest day-to-day operating satisfaction. Ask for case histories.

**Reg. trademark of Imperial Belting Co.*

Write for FREE new catalog and engineering handbook

Valuable guide for every user of conveyor, elevator and power transmission belting.

*You expect more from Imperial . . . and you get more!*

**Imperial BELTING CO.**

1755 S. Kilbourn Ave., Chicago 23, Ill.

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# With the Editors

**ANOTHER Record:** As you will note in the reports presented elsewhere in this issue, and to be concluded in July, the 61st annual convention of the American Foundrymen's Society and the 1st Engineered Castings Show proved quite attractive to a large number of people in the foundry and allied industries. Attendance exceeded any previous year when the exhibition of foundry equipment and supplies was not a feature.

The technical program was interesting and stimulating. The show illustrated to both producers and consumers the ramifications of castings as engineering materials. The Cincinnati chapter members were wonderful hosts, and the convention and show were given considerable excellent publicity by the Cincinnati newspapers. Even the weatherman co-operated.

If you were not fortunate enough to receive the convention inspiration first hand, we recommend the extensive reports in this issue, which were prepared by the editors during the convention in Cincinnati.

—o—

**An Extra Copy:** Do you wish frequently that you could secure an extra copy of one or more feature articles appearing in FOUNDRY?

Because the number of requests for an extra copy of articles has been increasing, the editors have arranged for overruns of forms containing such editorial material. The present supply starts with the April, 1957 issue.

As long as the supply lasts, we will be pleased to provide an extra copy of any feature article as requested.

You can make the request on the special "Reader Information Service" card, on page 51 of this issue, or by sending your request direct to Virginia Harms, FOUNDRY, Penton Building, Cleveland 13, O.

Just make your needs known.

—o—

**Visit Atomic Reactor:** William A. Phair, editor, *Hardware Age,* and president of the Society of Business Magazine Editors, the largest and most progressive professional organization in its field, recently asked, "What are the ideal characteristics of a good editor?" He then went on to answer his question as follows: "Many people have tried to answer this question, but none has really succeeded. I do think, however, that you (meaning the editors) will all agree that an editor is supposed to have a variety of information in his mind at all times. He is supposed to be an expert on practically everything, in his field and outside of his field. This is a most unreasonable role to impose upon any poor editor, but the fact remains that it is his burden."

To provide background in many subjects, programs of the SBME in Washington and other cities are quite varied. For example, several weeks ago the business paper editors spent a day at the Naval Research Laboratory inspecting the atomic reactor there and listening to a fine program on the many ramifications of atomic energy.

One of the several groups of editors on the tour is shown below on a traveling bridge over the reactor

# Harbison-Walker CUPOLA REFRACTORIES particularly suited for each specific need

All the different kinds of refractories for both acid and basic cupola operations are produced in various leading brands at Harbison-Walker plants in many states. These comprise all the commercial classes of fireclay brick ranging from the highly siliceous to those of high alumina content, the full complement of high alumina brick, various monolithic refractories and the basic brick brands and ramming mixes which fulfill the requirements for basic operations.

Some typical Harbison-Walker cupola refractories are listed in the following:

## For ACID Practice

**In the stack, preheating zone, melting zone, well—and for back-up in all zones . . .**

Harbison-Walker High Duty fireclay brick brands provide the various combinations of properties especially needed for maximum service life. These are available for lowest transportation costs from plants in Pennsylvania, Maryland, Ohio, Kentucky, Alabama and Missouri.

**In the charging zone . . .**

H-W EXTRA STRENGTH CASTABLE makes a hard strong refractory concrete lining which is extremely resistant to impact and abrasion. It is adequate for service at temperatures up to 2400° F.

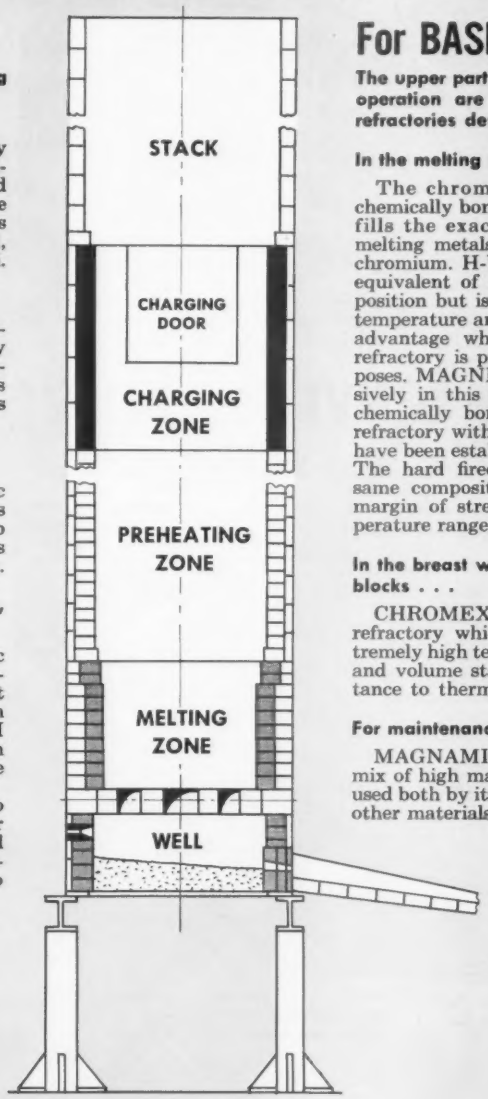
**In the melting zone . . .**

H-W KUPLOMIX forms monolithic linings free from vulnerable joints. It is highly siliceous and very resistant to the corrosive action of non-basic slags and to erosion by molten metal and slag.

**In wells, spouts, tap holes, runners, breast walls, ladles . . .**

H-W BLACK PATCH is a plastic refractory of super duty quality containing graphite. It is highly resistant to wetting and penetration by molten iron and slags. H-W BLACK PATCH is also made in preformed shapes which are used with special benefit in these applications.

For the very severe conditions to which tapping blocks and skimmer brick are subjected, VARNON BF and KORUNDAL which are highly refractory and have unusual resistance to erosion, render outstanding service.




## For BASIC Practice

**The upper part of cupolas used in basic operation are lined with the various refractories described for acid practice.**

**In the melting zone . . .**

The chrome-free MAGNEX CF chemically bonded magnesite brick fulfills the exacting requirements for melting metals which must be free of chromium. H-W MAGNESITE is the equivalent of MAGNEX CF in composition but is prefired at a very high temperature and serves with particular advantage where this class of basic refractory is preferred for certain purposes. MAGNEX which is used extensively in this application, is a strong chemically bonded magnesite chrome refractory with which excellent records have been established in cupola linings. The hard fired MAGNEX B of the same composition provides an added margin of strength over a wide temperature range.

**In the breast walls and for tap-out blocks . . .**

CHROMEX B, a chrome-magnesite refractory which is burned at an extremely high temperature is very strong and volume stable and has high resistance to thermal shock and corrosion.

**For maintenance . . .**

MAGNAMIX is a granular ramming mix of high magnesia content which is used both by itself and in mixtures with other materials of lower magnesia content to increase refractoriness and chemical resistance to highly basic slags. It is readily applied by ramming and by air-gun placement.

**HARBISON-WALKER REFRACTORIES CO.**
AND SUBSIDIARIES
*World's Most Complete Refractories Service*
**General Offices: Pittsburgh 22, Pennsylvania**

# Ask Standard

*how to cut costs with conveyors*

Standard limit-switch-controlled Automatic Reciprocator is one of two used to form 200-ft. overhead detour of dehumidifier assembly line.

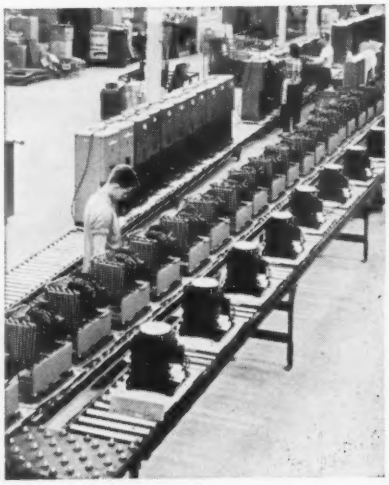
## "COMPLETE CONVEYORIZING" . . . what it did in a smaller plant

**Products at Ebco stay on conveyors until packaged and sent to shipping.**

Ebco Manufacturing Company — employing 275 people to produce water coolers, beverage dispensers and dehumidifiers — has realized substantial savings by completely conveyorizing their operations. Ebco engineers planned for an orderly conveyor system when developing plant layout and building design; consequently conveyor system costs were kept "low" and resulting efficiency is "excellent."

Similarly, it will pay you to take another close look at your present conveyor system. Standard specialists will be pleased to help you make evaluations . . . recommend the proper equipment and its application to meet your specific needs.

STANDARD CONVEYOR COMPANY, North St. Paul 9, Minnesota. Sales and Service in Principal Cities.



Gravity roller conveyors like this, used for Ebco's assembly lines, are inexpensive, easy to set up, and economical to maintain.

*For details on Standard Conveyors of all types, contact the Standard representative listed in your classified phone book or write direct. Ask for Bulletin N-6.*

pool, looking toward the point where the reaction takes place. I am the third from the left. Bill Gude saw the reactor on a personally conducted tour a few weeks earlier. Both of us thought it was a most interesting trip.

—o—

**Opportunity for Metallurgists:** Progress in nuclear science has led some to think chiefly in terms of the physicist when considering pressing needs for technically trained people. This neglects the important fact that engineers with other types of specialized training will be needed if the power of the atom is to be applied to the benefit of our civilization.

Metallurgy is one of the fields offering an interesting career to young men, according to Gustav Laub, vice president, Vanadium Corp., New York. Mr. Laub points out that "Opportunities beckon whether the young metallurgist desires to progress in basic research, technical development, operations, customer service or sales. Doors are open in every industry which makes or uses metals. These doors lead to great opportunities, rewarding achievement and service."

Many of these opportunities are provided by the foundry industry. As we move forward in finding ways to cast new metals, improve old castings methods, and meet pressing demands of such fields as aircraft and nuclear energy, the opportunities for rewarding service will grow.

—o—

**Fine Promotion:** Many organizations furnishing machines and materials to the foundry industry give lip service to the idea of promoting the sale of castings. At least one has done something about it.

The Coke and Iron Division of Pittsburgh Coke & Chemical Co., Pittsburgh, has published a beautiful 20-page booklet entitled "Gray Iron, the Industry that Serves Everyone."

The text includes a diagram showing many of the important uses of gray iron castings, a discussion of how gray iron is a vital industry in a growing economy, important facts about the gray iron industry, an illustrated story on "How a Gray Iron Casting Is Born," and how pig iron and coke serve the industry. Illustrations and color have been used lavishly.

Many in the foundry industry have commented most favorably on this promotion effort.

The Coke and Chemical Division is to be congratulated on a splendid job. F.G.S.

**read how you can save up to $290 a day in cupola coke consumption**

Here are other helpful Whiting bulletins that can help answer your Hot Blast questions



"How To Make Your Cupola Operation More Efficient"—FO-1



"Hot Blast For Better Melt, Closer Control, Greater Economy"—FO-3



"Review Of Foundry-Cupola Gas and Temperatures"—FO-9



"Suggestions For Solving Some Cupola Operation Problems"—Bulletin FO-8

Based on an average 400-ton per day cupola melt, pre-heated blast can raise metal temperatures and at the same time create a 28% coke savings! This is possible at an expenditure of only $45 in gas fuel, giving an actual fuel savings of $290 per average work day and many thousands of dollars per production year.

Now any cupola can be converted at low cost with a Whiting-Thermo Hot Blast Heater to provide the highest efficiency in hot blast. Whiting has prepared a new booklet on this cost cutting hot blast heater which tells about all hot blast advantages. It also fully describes burners, combustion chambers, heat exchangers, air booster fans, control panel and controls, auxiliaries, and air by-pass as well as general design features. Write for this free booklet today! Ask for Bulletin FY-174. Ask for the other bulletins shown also!

WHITING

**WHITING CORPORATION**

15607 Lathrop Avenue • Harvey, Illinois

*Circle 563 on Inquiry Card—Page 51*

*Increase ladle life*

## . . . with J-M 3X Blazecrete® the hydraulic setting refractory

You can make longer lasting linings for ladles with J-M 3X Blazecrete, because it is spall-resistant, withstands slagging action and has negligible shrinkage.

3X Blazecrete . . . the 3000F refractory . . . is easily and quickly applied . . . mix with water like ordinary concrete, and slap-trowel to desired thickness. Hardens without application of heat. Contains no harmful irritants . . . safe even for hand application. 3X Blazecrete is furnished as a dry mix, and may be stored indefinitely without deterioration.

You'll also find 3X Blazecrete ideally suited for forming run-out spouts and for gunning parts of iron cupolas.

Send for free brochure on Blazecrete (RC-28A) describing its properties and uses. To obtain your copy—as well as additional application details—write Johns-Manville, Box 14, New York 16, N. Y. In Canada, 565 Lakeshore Road, Port Credit East, Ontario.

*Whether you gun it...* *or slap-trowel it...*

JOHNS-MANVILLE JM PRODUCTS **Johns-Manville BLAZECRETE**

**BUILDS BETTER REFRACTORY LININGS**

# CALENDAR of Meetings

**June 10-11—Magnesium Association,** summer meeting, Homestead, Hot Springs, Va.

**June 11-13—Western Plant Maintenance and Engineering Show,** Civic Auditorium, San Francisco.

**June 13-14—Malleable Founders' Society,** annual meeting, Broadmoor, Colorado Springs, Colo.

**June 16-21—American Society for Testing Materials,** annual meeting, Chalfonte-Haddon Hall, Atlantic City, N.J.

**June 20-21—American Foundrymen's Society,** 2nd annual foundry instructors' seminar, Kellogg Center, Michigan State University, East Lansing, Mich.

**June 20-22—Penn State Foundry Conference,** sponsored by Pennsylvania State University in co-operation with AFS chapters in New York and Pennsylvania and several independent foundry groups. Pennsylvania State University, University Park, Pa.

**June 23-25—Alloy Casting Institute,** annual meeting, Homestead, Hot Springs, Va.

**June 27-28—Refractories Institute,** annual meeting, Greenbrier, White Sulphur Springs, W. Va.

**Sept. 9-13—Instrument Society of America,** 12th annual instrument automation conference, Cleveland.

**Sept. 17-20—American Die Casting Institute,** annual meeting, Edgewater Beach Hotel, Chicago.

**Sept. 23-24—Steel Founders' Society of America,** fall meeting, Homestead, Hot Springs, Va.

**Sept. 26-28—Missouri Valley Regional Conference,** sponsored by St. Louis, Tri-State and Mo-Kan chapters, AFS, and Missouri School of Mines Student Chapter, Missouri School of Mines and Metallurgy, Rolla, Mo.

**Oct. 3-4—Refractories Institute,** fall meeting, Grand Hotel, Point Clear, Ala.

**Oct. 3-4 — Michigan Foundry Conference,** sponsored by Central Michigan, Detroit, Saginaw Valley and Western Michigan chapters, AFS, in co-operation with Michigan State University and University of Michigan, Kellogg Center, Michigan State University, East Lansing, Mich.

**Oct. 9-11—Gray Iron Founders' Society,** annual meeting, Drake Hotel, Chicago.

**Oct. 12-15—Conveyor Equipment Manufacturers Association,** annual meeting, Grand Hotel, Point Clear, Ala.

**Oct. 17-18—Magnesium Association,** annual convention, Biltmore Hotel, New York.

**Oct. 17-19—Foundry Equipment Manufacturers Association,** annual meeting, Greenbrier, White Sulphur Springs, W. Va.

**Oct. 21-25—National Safety Council,** national safety congress and exposition, Conrad Hilton Hotel, Chicago.

**Nov. 4-8—American Society for Metals,** national metals exposition and congress, International Amphitheatre, Chicago.

**Nov. 7-8—National Foundry Association,** annual meeting, Waldorf-Astoria Hotel, New York.

**Nov. 11-13—Steel Founders' Society of America,** technical and operating conference, Hotel Carter, Cleveland.

**Dec. 4-6—American Institute of Mining, Metallurgical and Petroleum Engineers,** electric steel furnace conference, Penn-Sheraton Hotel, Pittsburgh.

**1958**

**Jan. 27-28—Industrial Heating Equipment Association,** annual meeting, Penn-Sheraton Hotel, Pittsburgh.

**Feb. 9-14—American Society for Testing Materials,** committee week, Statler Hotel, St. Louis.

**Mar. 12-13—Foundry Educational Foundation,** college-industry conference, Hotel Statler, Cleveland.

**Mar. 17-18 — Steel Founders' Society of America,** annual meeting, Drake Hotel, Chicago.

**May 12-16—American Society for Metals,** 1st Southwestern metal congress and exposition, Automobile Bldg., Dallas, Tex.

**May 22-28—American Foundrymen's Society,** 62nd annual convention and exhibition, Public Auditorium, Cleveland.

# FIST-FULL OF EASY READING FOUNDRY INFORMATION

Valuable data on the properties and uses of foundry alloys are available to all foundrymen, without charge, from ELECTROMET's extensive technical library. ELECTROMET's easy-to-read booklets list the advantages of the different foundry alloys and recommend the best practices for using them in the production of cast iron, steel, or non-ferrous metals. For the stainless steel foundries, there are also some useful booklets on the latest stainless steel melting practices.

Choose the booklets that will help you and circle the appropriate numbers on the handy ordering coupon below. To get a complete list of ELECTROMET's foundry literature, circle F-6924 on the coupon.

**ALLOYS FOR ALL FOUNDRIES**

*"Electromet" Ferro-Alloys and Metals.* A catalog showing the advantages and uses of all ELECTROMET foundry alloys. Circle F-2495.

**IRON FOUNDRIES**

*"SMZ" Alloy—An Inoculant for Cast Iron.* Circle F-4604.

*Briquetted Alloys for the Iron Foundry Industry.* Circle F-3465.

*Chromium in Cast Iron.* Circle F-2465.

**STAINLESS STEEL FOUNDRIES**

*Observations of Stainless Steel Melting Practices.* Circle F-20,006.

*Oxygen Blowing Rate in Stainless Steel Melting.* Circle F-20,032.

*Effect of Oxygen Input Rates in the Decarburization of Chromium Steel.* Circle F-20,040.

**ELECTRO METALLURGICAL COMPANY**

*Division of*
*Union Carbide Corporation*

Department C

30 E. 42nd St., New York 17, N. Y.

*Offices in 10 Major Cities*

*In Canada:* Electro Metallurgical Company, Division of Union Carbide Canada Limited, Toronto.

Electromet
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**FERRO-ALLOYS AND METALS**

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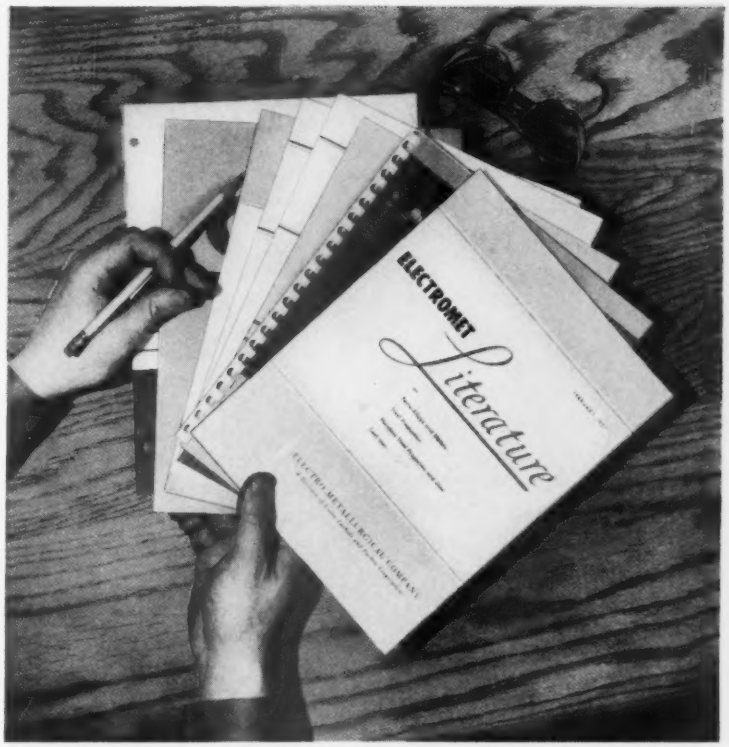



Gentlemen:

Please send me, without obligation, the literature circled below:

| | | | |
|---|---|---|---|
| F-2465 | F-2495 | F-3465 | F-4604 |
| F-6924 | F-20,006 | F-20,032 | F-20,040 |

*Name* _____

*Company* _____

*Address* _____

*City* _____ *Zone* _____ *State* _____

# ...increasing productivity without adding personnel!

Management men in every industry are giving productivity and profits—*as well as personnel*—a lift by integrating Towmotor mass-handling in all operations from receiving to delivery.

Every department benefits. More work gets done. And you don't need more men to do it because Towmotor fork lift truck operators are finding it's *fun* to multiply the handling of materials aided by 12 new Towmotor improvements like these:

- New functional body styling
- New pace-setting comfort features
- New "tight-spot" maneuverability
- New centralized easy-reach controls
- New positive-response hydraulic lift
- Towmotor-improved power steering

Some of the industry's most significant advances in fork lift truck design and performance are shown in Towmotor's latest bulletin #SP-23. See how they help supplement your personnel—permit your men to do a bigger day's work easier—give each operator the power to improve your plant's productivity and profits.

Write Towmotor Corporation, Cleveland 10, Ohio. We'll send the illustrated booklet immediately.

***Leaders for 38 years in building Fork Lift Trucks and Tractors***

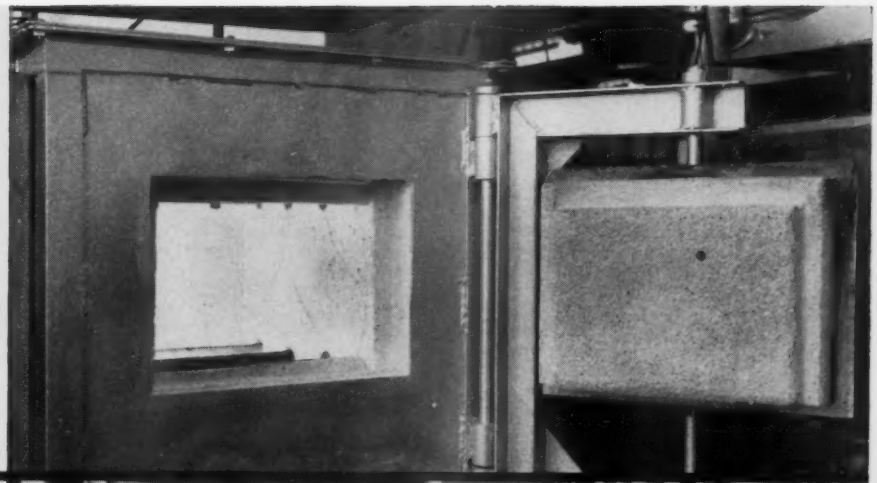
**TOWMOTOR** — THE ONE-MAN-GANG ® — **-GERLINGER**

*Gerlinger Carrier Company, Dallas, Oregon is a subsidiary of Towmotor Corporation, Cleveland, Ohio*

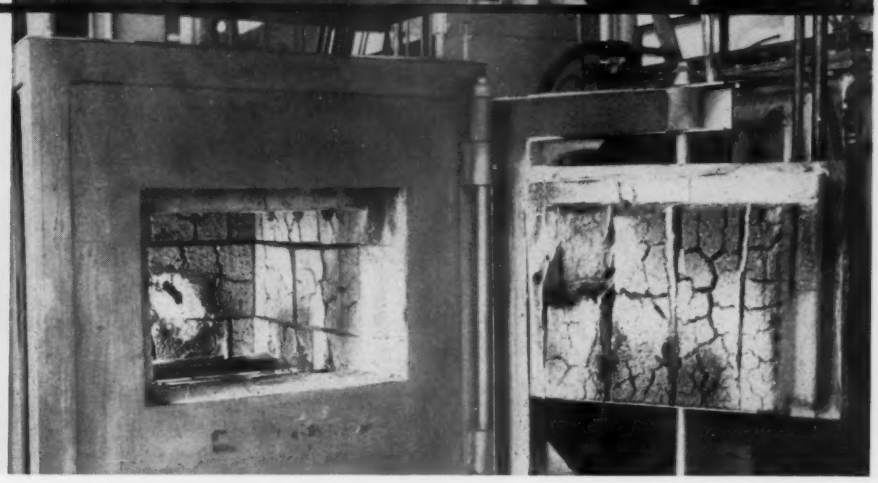


*Circle 566 on Inquiry Card—Page 51*

**LINED WITH ALUNDUM 33-I CASTABLE,** this furnace has been used for almost a year as a periodic furnace for high-temperature laboratory test work. During this time the door was opened and closed over a thousand times with the furnace at temperature. Even after this rugged service, the ALUNDUM Castable lining shows hardly any signs of wear.



**LINED WITH A COMPETITIVE HIGH GRADE INSULATING BRICK,** this similar furnace was used in the same service for an equal length of time. Under equally severe thermal shock conditions the lining cracked and spalled and this furnace must be rebuilt.



# You get higher temperature protection with ALUNDUM* castables

## *Up to 3300° F!*

**ALUNDUM 33-I Insulating Castable** is made up primarily of countless tiny, pure aluminum oxide bubbles. Forming a network of air spaces it provides excellent insulation, even at the highest commercial temperatures.

**ALUNDUM 33-HD Heavy Duty Castable** is chiefly composed of dense grains of pure aluminum oxide. It is recommended for forming dense monolithic surfaces in constructing many types of furnaces where high temperature conditions are more severe.

**Both ALUNDUM 33-I and 33-HD Castables** protect at temperatures up to 3300° F and are very easy to mix and use. You can cast simple or complex shapes with them quickly and inexpensively for many installations and replace more expensive pre-fired shapes.

See your Norton Representative for more facts on how these new Castables can provide long, trouble-free service that saves you time and money. Ask him for the folder *Two New Norton Castables*, or write for your free copy to NORTON COMPANY, Refractories Division, 305 New Bond Street, Worcester 6, Mass.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

**NORTON**

**REFRACTORIES**

*Engineered... Rx ...Prescribed*

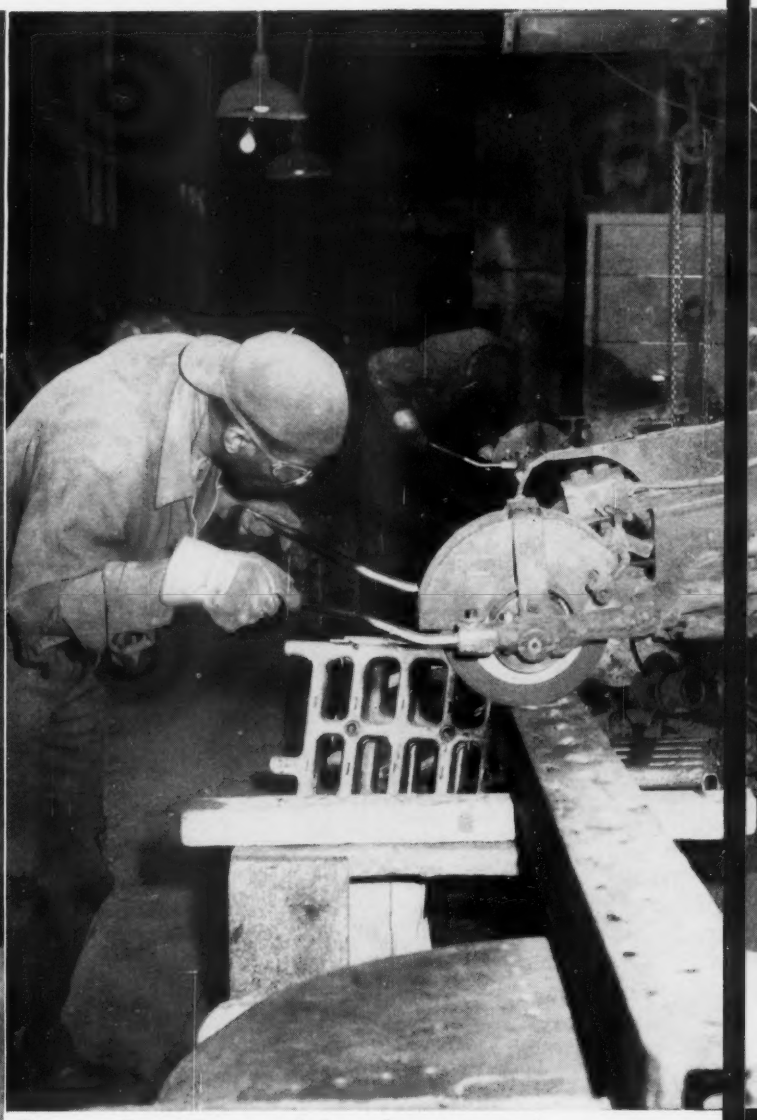
*Making better products . . . to make your products better*

**NORTON PRODUCTS:**
Refractories • Abrasives
Grinding Wheels • Grinding Machines
**BEHR-MANNING DIVISION PRODUCTS:**
Coated Abrasives • Sharpening Stones
Behr-cat Tapes



*Circle 567 on Inquiry Card—Page 51*

# ALLOY GRINDING in a PROGRESSIVE FOUNDRY



Cleaning Room Foreman Charles Karr is proud of his department's record in safety, production, and costs.

Swing frames snag the larger castings. Alloy foundrymen will recognize the absence of sparks on these tough metals.

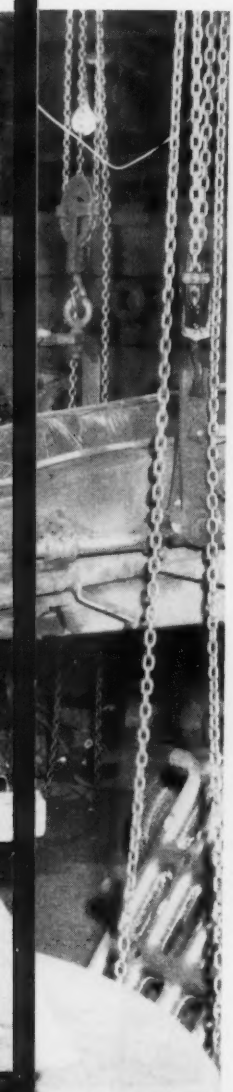
## *Bay State Grinding Wheels Help Keep Cleaning Costs Low at General Alloys Company*

Casting alloy metals for America's food-processing, chemical, oil, and heat treating industries is the business of General Alloys Co., South Boston, Mass.

The metals they pour are tough ones: stainless, as well as the special alloys developed to resist heat, acids, and other chemicals. Because each is also a tough metal to grind, cleaning costs are an important cost factor. This makes the life and cutting qualities of grinding wheels especially critical in selecting the right wheel for each job.

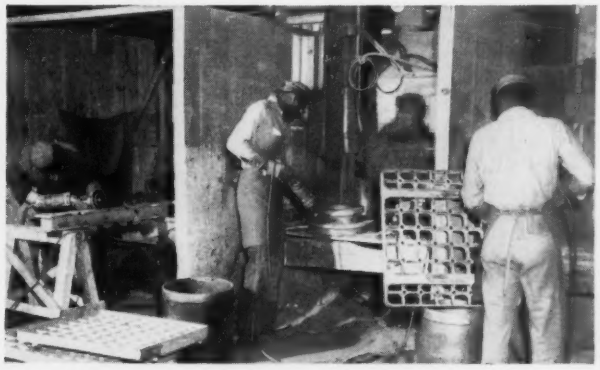
Because its cleaning room demands dependable abrasive products and engineering service covering all phases of foundry grinding, General Alloys Company has used Bay State as a principal supplier for many years.

A call to any Bay State distributor or branch office will bring the same capable abrasive product service to your foundry . . . or write direct to the Westboro plant.



Cut-off wheels also have tough assignments on these alloy metals. Note air-operated chain clamp for safety.

Small swing frame grinder, with 12" x 2" wheel makes fast work of odd shaped parts locked in adjustable air vise.



Separate booths accommodate portable grinding of intricate parts. Some use 7" and 8" straight wheels on high-cycle grinders. Others use mounted wheels and 2½" x ⅜" resinoid wheels.

Double and single head pedestal grinders with 16", 20", and 30" wheels handle the bulk of the smaller alloy castings.

BAY STATE®
WHEELS of PROGRESS

**BAY STATE ABRASIVE PRODUCTS CO., Westboro, Massachusetts, U. S. A.**

*Branch Offices and Warehouses:* Bristol, Conn., Chicago, Ill., Cleveland, Ohio, Detroit, Mich., Pittsburgh, Pa.
*Distributors* — All principal cities • In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ont.

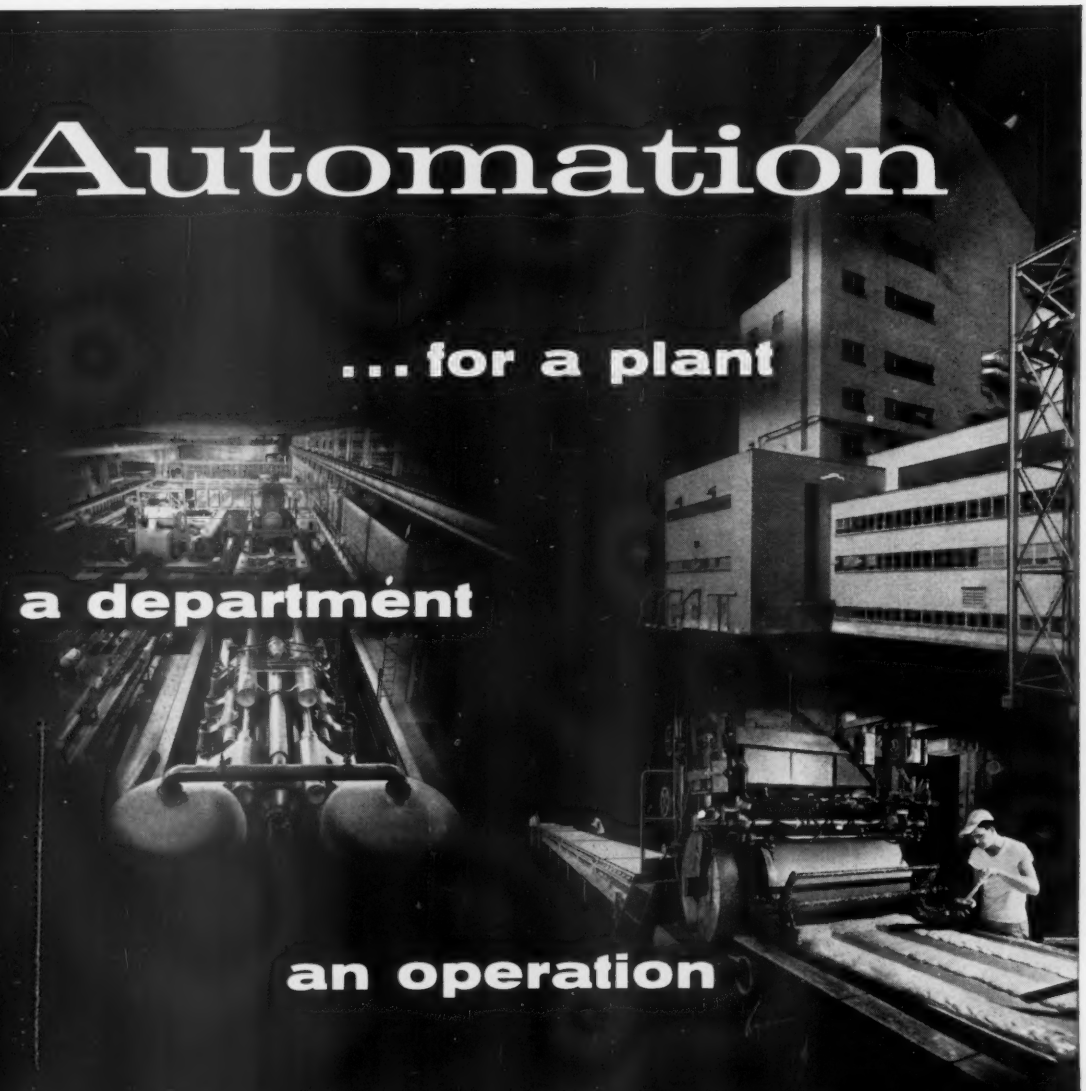
*Circle 568 on Inquiry Card—Page 51*

# Automation

## ... for a plant

## a department

## an operation



Frequently, the design of a single machine, or piece of equipment will do the job.

Whether a business is big or small, the correct application of automated equipment will increase output . . . improve product quality . . . and lower unit costs. And it can be done on a practical, cost-recovery basis! Determining whether you need automation or mechanization, *and how much or how little*, is a job that requires seasoned professional engineering experience with its attendant insights into production problems common to many industries.

Tailoring automation to meet your needs, through the design and development of automated production equipment, is among the major services offered by Giffels & Vallet. It is a service which can establish a new standard of production efficiency in your plant.

Giffels & Vallet services are discussed in a special Planning Brochure. A copy will be mailed on request.

INDUSTRIAL ENGINEERING DIVISION

**Giffels & Vallet inc.**

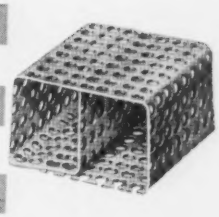
DETROIT 26, MICHIGAN New York and Houston

*Canadian Affiliate: Giffels & Vallet Ltd., Toronto and Windsor*

Engineers Serving Industry for Over Thirty Years

Plant Layout • Process Development • Automation Engineering • Materials Handling • Machine Design • Building Design

# NAME THE CASTING JOB FANNER HAS THE CHAPLET OR CHILL



When you need chaplets or chills . . . remember that only FANNER has a complete line of chaplets and chills for every casting requirement. Each one is precision engineered and manufactured to tolerances of ± .002 to insure better castings . . . savings in labor and reduction of scrap losses. Regardless of the kind of metal you use or type of casting you produce, you can secure the exact chaplets or chills you need from this one source. As a result, when you standardize on FANNER you save on delivery, on production and in lower costs. Write for our chaplet and chill catalogs — both are filled with valuable data on casting methods.

**THE FANNER MANUFACTURING CO.**

*Designers and Manufacturers of Fine Fanner Chaplets and Chills*

**BROOKSIDE PARK** **CLEVELAND 9, OHIO**

# *Only* COLEMAN TOWER® OVENS
## provide all these major advantages

### INCREASE PRODUCTIVITY

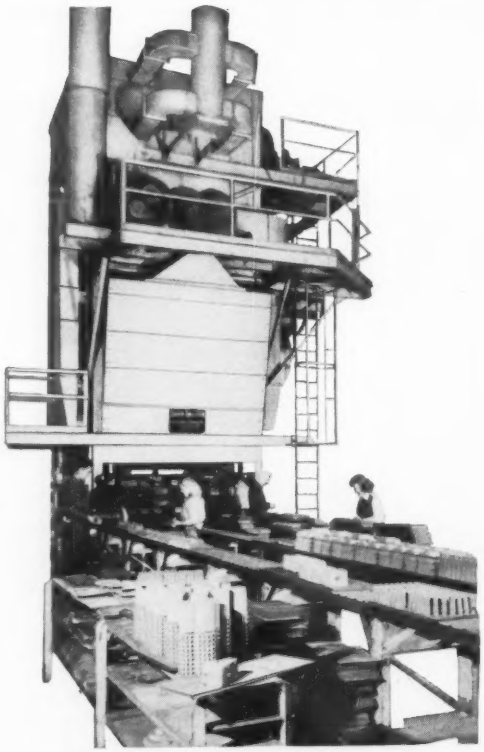
Savings through consistent, dependable production of perfectly baked cores; eliminating rejects, makeovers and casting losses due to improper core baking.

### SAVE SPACE

Vertical design permits saving of approximately 75% of floor space over batch ovens of the same capacity. Cores are "smoked-off" and cooled before leaving unloading station.

### REDUCE MAINTENANCE

Heavy duty construction for continuous, dependable performance and economical operation reduces maintenance cost to a minimum.



Coleman Tower ovens use only 25% of floor space required by batch type ovens of same capacity.

### SAVE TIME

Cores of widely different sizes and shapes can be handled at the same time, all baked with consistent uniformity. Trucks, racks and money-wasting handling methods are eliminated.

### SAVE BINDER

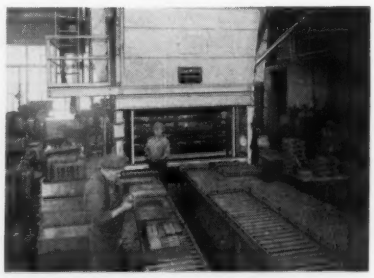
Proper core baking atmosphere and uniform temperature provide sizeable savings in conventional or high speed binders.

### SAVE FUEL

The recovered heat is used over again, thus yielding important fuel saving. The most economical fuel available to you can be conveniently used.

Patented Open Center permits close, efficient grouping of coremakers around the oven... results in increased coremaker productivity.

3-way loading feature increases accessibility 300% over ordinary vertical oven designs.



Recuperative cooling system "smokes-off" and cools the cores before they reach unload station.

**Coleman Tower Ovens are the most widely used continuous core baking ovens in the foundry industry. They have brought the advantages of mechanization to large and small foundries and have made important cost reductions. Why not find out whether Coleman Tower Ovens can bring the same savings to you? Our engineers are available without obligation to make practical recommendations for your particular requirements... call or write today!**

**WRITE FOR BULLETIN 54**

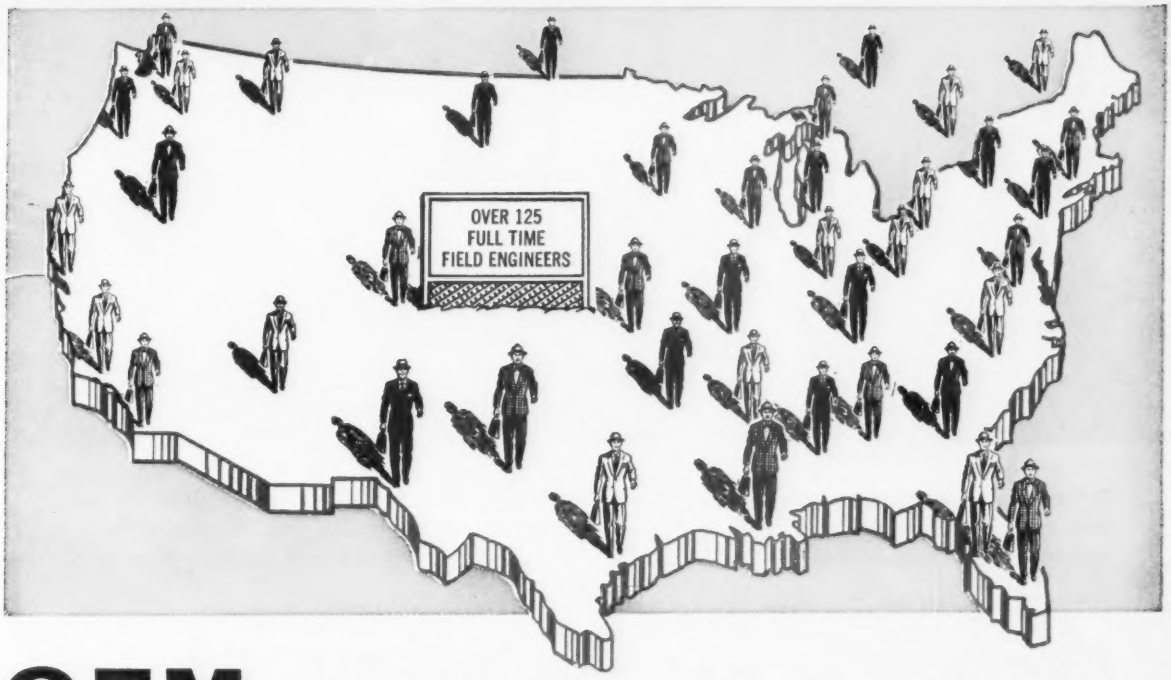
**A COMPLETE RANGE OF TYPES AND SIZES**

*for every core baking and mold drying requirement:*

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

**THE FOUNDRY EQUIPMENT COMPANY**
**1821 COLUMBUS ROAD** **CLEVELAND 13, OHIO**

*WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS*




# OEM USERS OF AIR CYLINDERS

## *have available Bellows Nation-Wide Field Service*

Original equipment manufacturers incorporating fluid power circuits in their products to meet the growing demand for higher output and lower cost face two problems:

***Original Design . . . and Field Service***

Bellows Air Motors and other Bellows "work devices" lend themselves readily to OEM design. For example, all operating valves, actuating elements, speed control regulators are built into the units, simplifying circuit and installation problems. All units are compact, streamlined, fit well into crowded quarters. All units can be positively interlocked with reciprocating machine elements.

More than 125 Bellows Field Engineers devoting their full time to the sales and service of Bellows equipment. One or more Field Engineers in every major industrial area in the United States and Canada . . . and in Australia, Europe and the British Isles provide certain assurance that any service requirement on any Bellows unit will be handled promptly.

And of equal importance — every Bellows Field Engineer is fully capable of working with you and your engineers in developing the most effective and most economical way of incorporating "fluid power" control and operation into your product.

We have prepared a new booklet showing a little of the widespread usage of Bellows Air Motors and related "fluid-power" devices in many OEM products. It makes interesting reading for the manufacturer looking for ways to increase the productive efficiency of his product. It is free on request. Write Dept. FO 657, The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario.

1425A

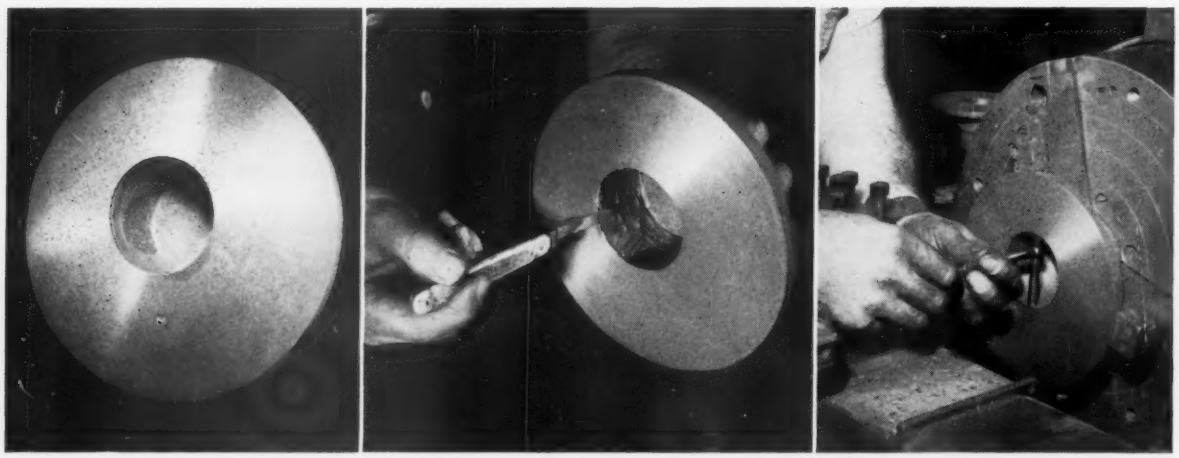
**The Bellows Co.**
**AKRON 9, OHIO**



Circle 572 on Inquiry Card—Page 51

Holes in thin-wall castings are economically repaired with epoxy resin cements. First step is to build a supporting base for the Metalset. In this case foundry sand was forced in the hole and levelled off just below the casting's surface. After the Metalset cures, the repaired area is buffed with a portable power tool.

# New Epoxy Resin Cements Are Machinable Have High Adhesion – Resist Corrosion



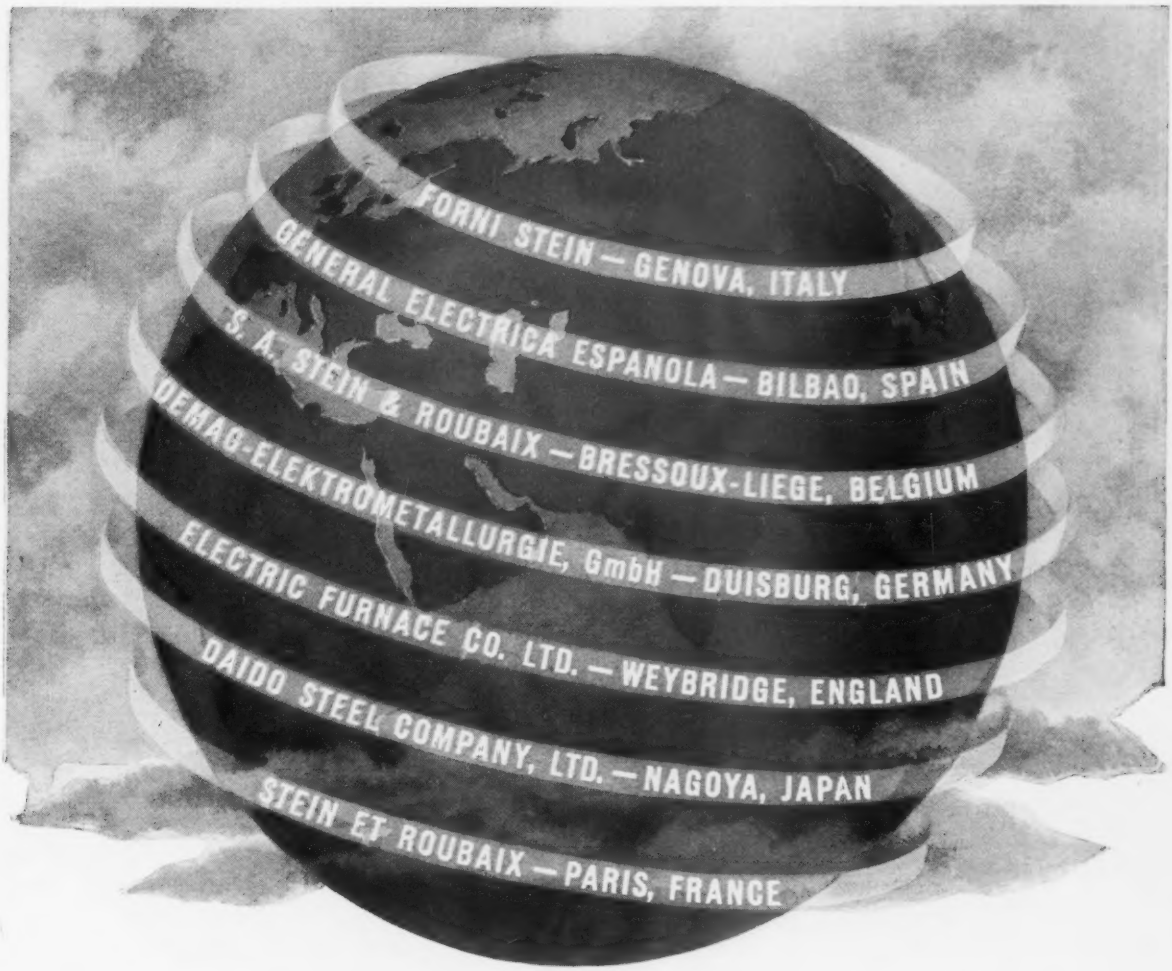
Nonstructural defects such as these are easily patched and machined with Smooth-On Metalset, an epoxy resin compound available with either iron or aluminum filler. Metalset can be applied in any thickness with less than one-tenth of 1% shrinkage, adheres well to iron, steel, aluminum and can be machined to a feather edge.

## FREE Samples of SMOOTH-ON Foundry Cements

**METALSET A2–Aluminum-filled epoxy resin**
**METALSET F1–Iron-filled epoxy resin**
**SMOOTH-ON No. 4AA–Cement for light gray castings**
**SMOOTH-ON No. 4A–Iron cement for medium gray castings**
**SMOOTH-ON No. 4B–Iron cement for dark gray castings**
**SMOOTH-ON No. 8–Similar to iron cements but with color of aluminum.**

Properties of Smooth-On's foundry cements, in use since 1895, are well known. The new Metalset cements are recommended where adhesion, machinability, or water resistance are stressed.

**SMOOTH-ON MANUFACTURING COMPANY, 572 Communipaw Ave., Jersey City 4, N. J.** SO 424


FORNI STEIN — GENOVA, ITALY
GENERAL ELECTRICA ESPANOLA — BILBAO, SPAIN
S. A. STEIN & ROUBAIX — BRESSOUX-LIEGE, BELGIUM
DEMAG-ELEKTROMETALLURGIE, GmbH — DUISBURG, GERMANY
ELECTRIC FURNACE CO. LTD. — WEYBRIDGE, ENGLAND
DAIDO STEEL COMPANY, LTD. — NAGOYA, JAPAN
STEIN ET ROUBAIX — PARIS, FRANCE

*'round the world they go . . .*

# Lectromelt* FURNACES

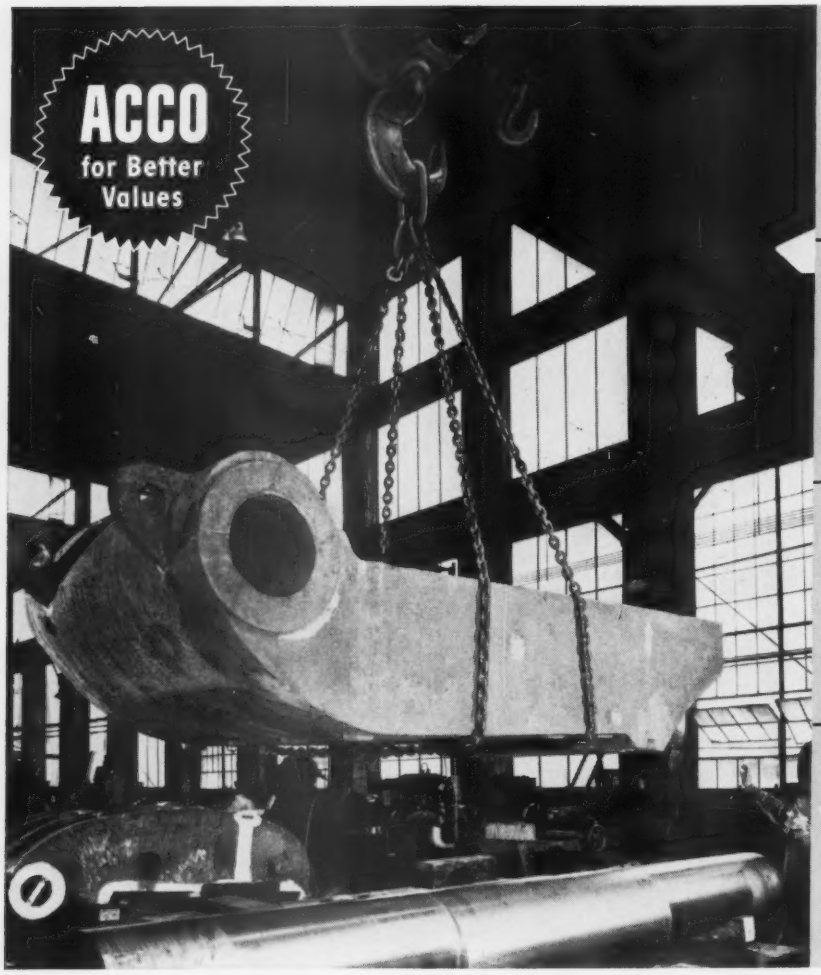
## and a world-wide family building them

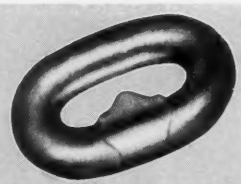
Metallurgical and chemical industries the world over use Lectromelt... the efficient, versatile electric furnaces designed by Lectromelt of Pittsburgh, U.S.A.

A carefully selected family of companies all over the world are licensed to manufacture and erect Lectromelt furnaces. Together, we have installations from South Africa to Finland, Chili to Canada, Turkey to Hawaii . . . anywhere melting, smelting, refining and reduction furnaces are needed.

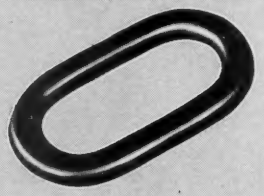
For further information, write to Lectromelt Furnace Division, McGraw-Edison Company, 314 32nd Street, Pittsburgh 30, Pennsylvania.

**Reg. T.M. U.S. Pat. Off.*



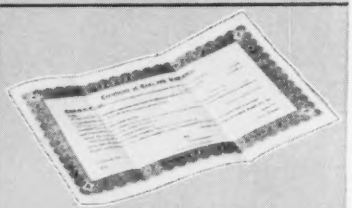



Accoloy X-weld 125 Chain
Pat. No. 2763768



New Shaped Master Link

ACCO Registration Ring



Registration Certificate

# Big, costly loads are safe with Acco Registered® Sling Chains

• Pictured above is a huge, 35,000-pound casting being lifted *easily and safely* by a 4-leg ACCO *Registered* Sling Chain. Directly beneath the load is a highly polished and machined crank shaft worth many thousands of dollars.

Imagine the cost in lost labor and materials, should the sling chain fail! But it won't fail—for this ACCO *Registered* Sling Chain and all its components have the inbuilt strength needed to handle the job with complete safety!

When you buy an ACCO *Registered* Sling Chain, you get these four exclusive "plus values" which *add materially to the worth, but not to the cost,* of the sling:

1 • **Accoloy X-weld 125 Chain**, for extra strength. This chain hangs straight . . . does not kink . . . has extra resistance to bending.

2 • **New Shaped Master Link**, uniquely shaped to withstand deformation under loads up to 18% greater than a round-section link can do.

3 • **ACCO Registration Ring**, serially numbered as evidence that the assembled sling has been factory proof-tested to twice its working load limit.

4 • **Registration Certificate**, signed by us, attesting to the field-tested design and proof-testing of the complete sling.

Remember, the best sling is one of your most economical material-handling tools. You'll find it good business to consult your ACCO *Registered* Sling Chain Distributor on all your sling needs; his counsel is available without obligation. If you don't know his name, write us at York, Pa.

**WHAT "ACCO REGISTERED" MEANS**

1 The best material
2 Unit safety factor (on bodies, rings, links, hooks)
3 Proof test of complete sling to twice the working load limit
4 Actual field service test of each design
5 Metal identification ring on each sling
6 Signed Registry Certificate with each sling

**American Chain Division**
**AMERICAN CHAIN & CABLE**
**Bridgeport, Conn. • Factories: *York and *Braddock, Pa.**

Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston, *Los Angeles, *New York, Philadelphia, Pittsburgh, *Portland, Ore., *San Francisco

***Indicates Warehouse Stocks***

ACCO
A C C
TRADE MARK



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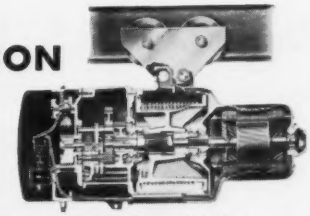
Circle 576 on Inquiry Card→

# WRIGHT Electric Hoists / for lowest final cost

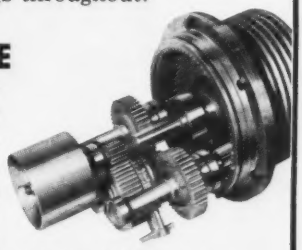
## These features make WRIGHT Speedway Hoists your best buy for—

### MORE PRODUCTION



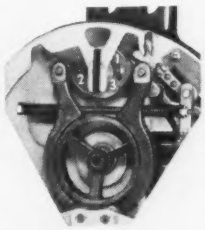
Fine balance and heavy duty design make possible the continuous handling of tough jobs on any duty cycle for which a 30-minute NEMA motor is satisfactory. All gears and pinions are alloy steel, heat-treated. Their ductile core supplies shock resistance to most severe service stresses. Anti-friction bearings throughout.

### LONGER LIFE



Strength of gear teeth of WRIGHT Frame 2 and 3 Speedway hoists has been doubled by a change in contour and grain structure of the metal. Internal gear ring with heavy flanged cross section is bolted to drum at six points and provides extreme resistance to distortion.

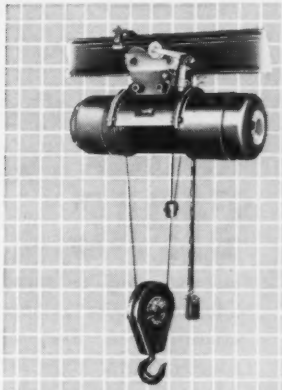
### EASIER MAINTENANCE



There is nothing to adjust but the cam to keep brake in perfect adjustment. When excessive load drift occurs... remove the screw shown at Position 1, swing the cam until Position 2 is in line. Replace the screw. Position 3 is provided for the final third of brake lining wear. Brake springs and solenoid never need adjustment.

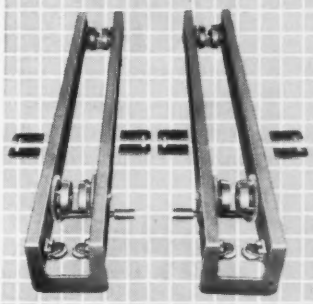
## Better performance at lower cost by using WRIGHT units for local-built cranes

### SPEEDWAY ELECTRIC HOIST



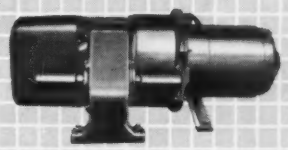
Available in Frame 1, 1½, 2 and 3 sizes with capacities from ¼ ton to 10 tons.

### END TRUCKS



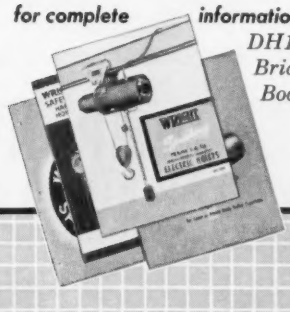
For motor-driven cranes and hand traveling cranes—both top running and under-hung types. Timken bearings throughout. Wide range of capacities.

### CRANE DRIVE UNIT



For crane and double-beam trolley propulsion. Electric motor transmits power through fluid drive to well proportioned gear reduction. Units are equipped with WRIGHT designed solenoid "drag" brake. Size 1—with motors to 2 HP. Size 2—with 3 to 7½ HP motors.

*for complete information on WRIGHT Hoists and Crane components ask for:* ***Speedway Hoists:*** *(Frame 1) Booklet DH133B, (Frame 2 & 3) Catalog E55A.* ***Motor Driven Cranes:*** *Underhung, Single Bridge, Bulletin #227; Top Running, Bulletins #DH448 or DH449 •* ***Crane Drive Units:*** *Booklet DH-431A •* ***Hand Traveling Cranes:*** *Bulletins #DH-468 and #DH-348B*



**Wright Hoist Division**
**AMERICAN CHAIN & CABLE**

ACCO

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

# SIPAC T.M. NON-CARBONACEOUS CORE COATING THAT PRODUCES SMOOTHER FINISHED CASTINGS

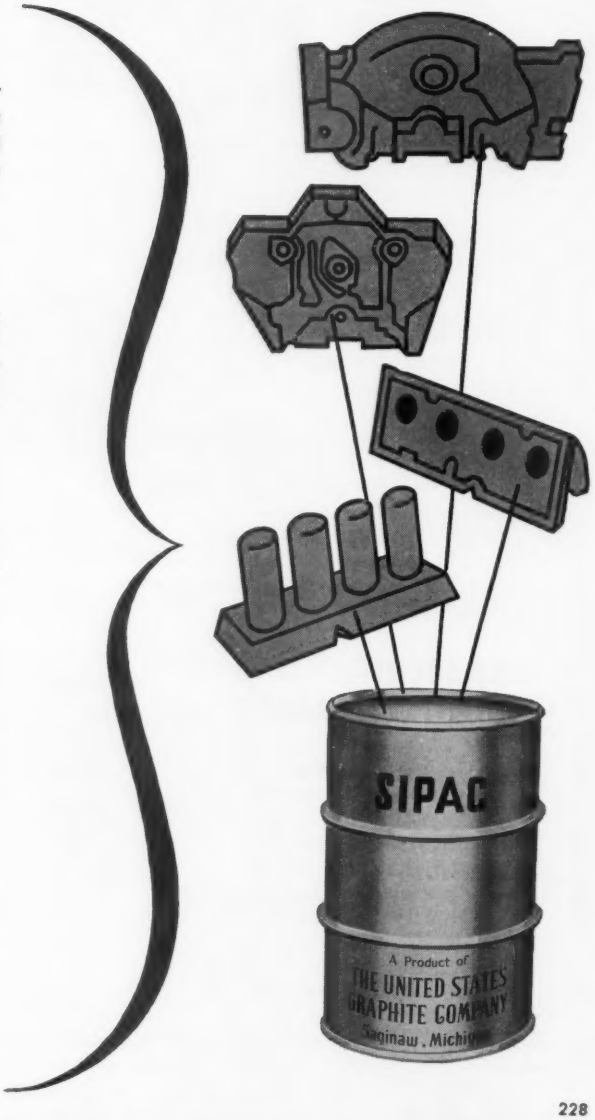
**SIPAC** United States Graphite Company's complete core coating, requires only the addition of water, and produces bright, gold-colored coating with fine, smooth surfaces—using any foundry sand.

**SIPAC** is non-carbonaceous and inert; will not react with any molten metal, including grey iron and steel. Clean to handle, its burnished gold color makes cores highly visible—a real help in placement of cores in the mold.

**SIPAC** costs less and gives improved casting quality. Resists flaking and completely seals core surfaces.

**AVAILABLE** in 55-gallon drums, (in paste form) ready for mixing and dilution to your desired Baume—even to a scale of 32—without settling.

**WRITE TODAY** for details about SIPAC or any other United States Graphite Company core and mold coatings.

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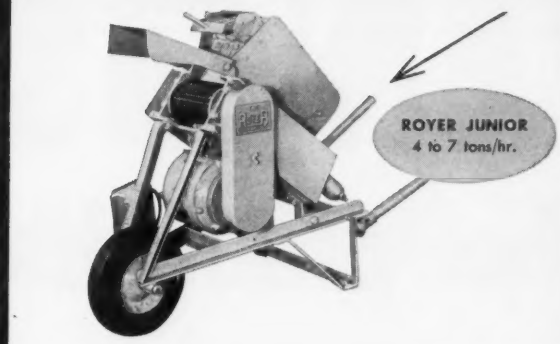
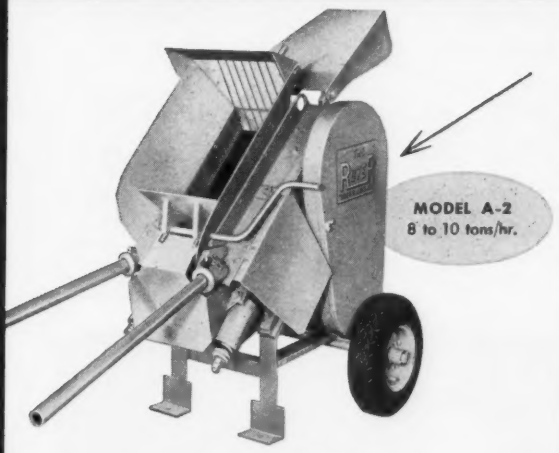
## THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® SINTERED METAL PARTS • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES




# Get fast, efficient sand preparation at low cost . . . IN THE TONNAGES YOU NEED



To meet the varying requirements for *sand conditioning and aeration* in the small and medium size foundry (job or production), the core room and side floor, Royer offers the Separators, Blenders and Aerators shown here. Fast, efficient and durable, these units enable you to choose a machine *designed for the tonnages you need,* regardless of the type of sand you use or the kind of metal you pour.

Here are a few of the advantages you'll gain with a Royer:

- Lowest labor costs
- Less new sand
- Less need for facing sand
- Reduced blows, drops, runouts and rough surfaces
- Low cleaning room costs
- Reduced discount losses
- Better sand cooling
- Riddling time practically eliminated

Foundrymen call Royer the "foremost in sand conditioning equipment" because Royer machines are in use throughout the world. *The majority of the foundries have bought additional units,* positive proof of satisfactory service.

Contact us today—by letter, wire or telephone—and we'll rush you descriptive literature describing the unit designed to meet your needs. Or, you can have our "foundry-wise" agents survey your problems with you.

*Foundry-wise agents throughout the U. S.*

*EXPORT DEPT.*
*10406 South Western Ave.*
*Chicago 43, Ill.*

*IN CANADA*
*Brown Engineering Corp.*
*15 Alcorn Ave., Toronto, Ont.*

ROYER

**ROYER FOUNDRY & MACHINE CO.**

159 PRINGLE STREET / KINGSTON, PENNA.

FOREMOST IN SAND CONDITIONING EQUIPMENT



Circle 578 on Inquiry Card—Page 51

Next Page Circle 579→

# if it's SAVINGS

## here's further proof that

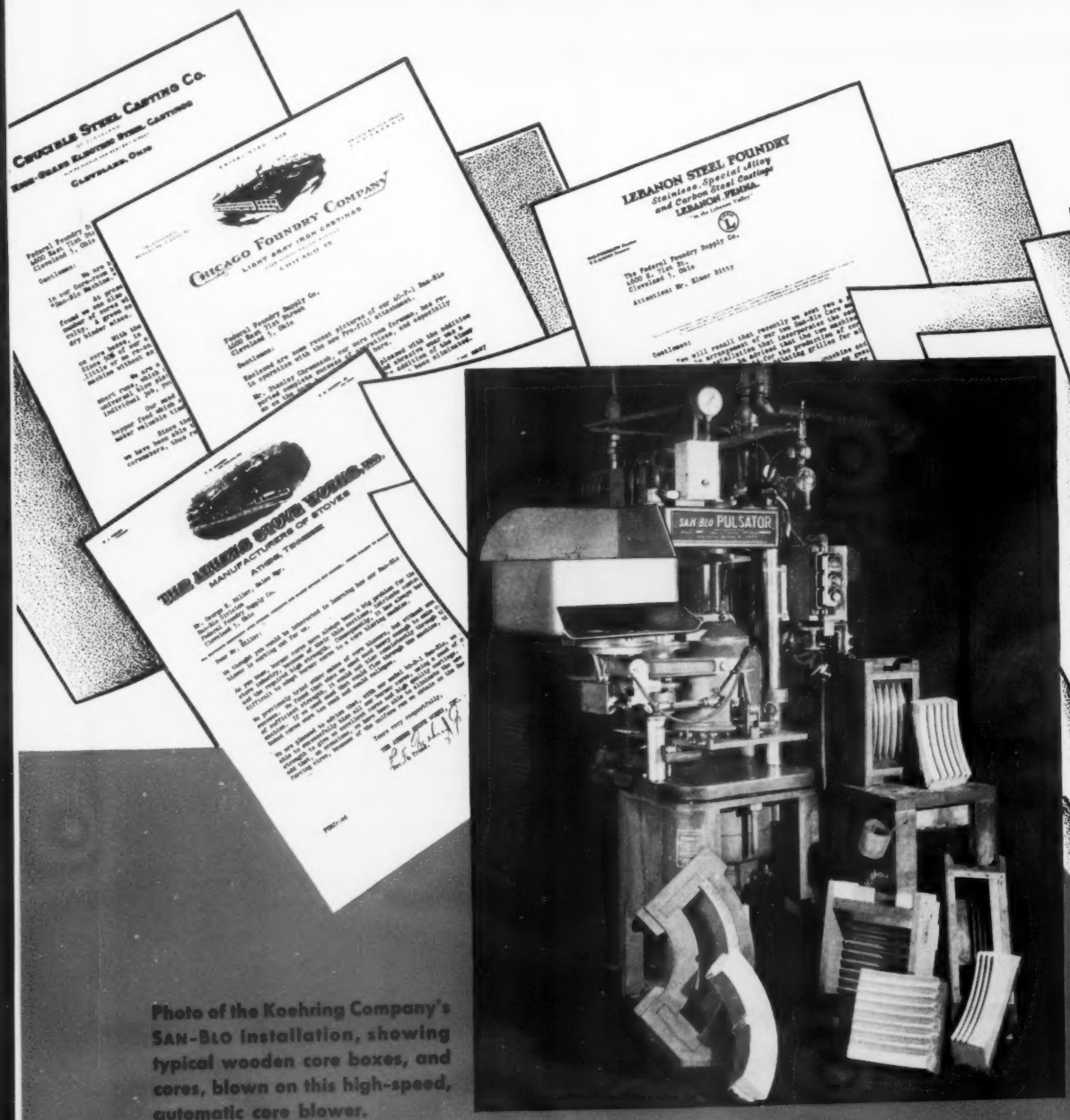


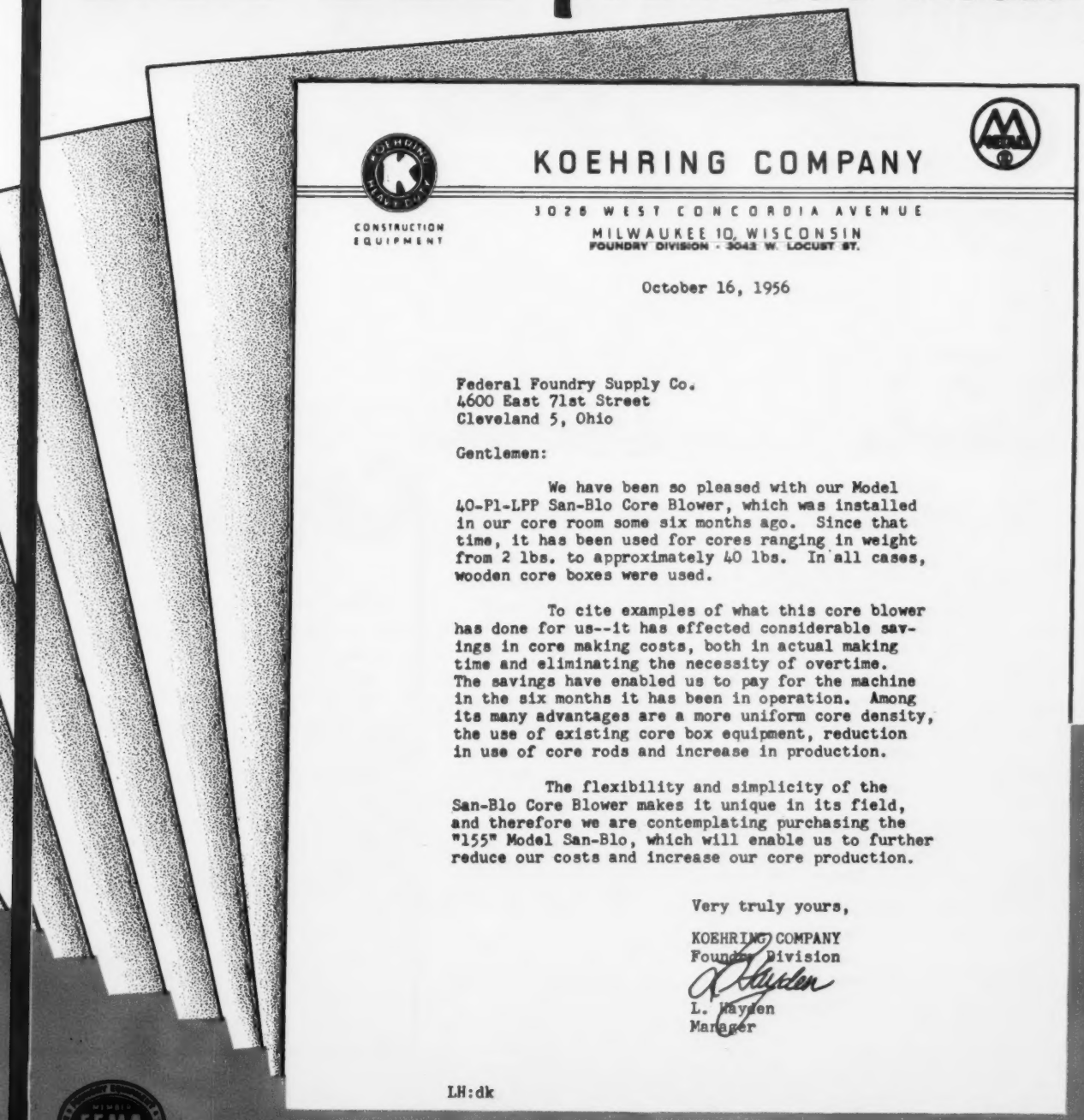

**Photo of the Koehring Company's SAN-BLO installation, showing typical wooden core boxes, and cores, blown on this high-speed, automatic core blower.**

Manufactured by

## San-Blo Division

# you're after...

# SAN-BLO provides them!



KOEHRING COMPANY

CONSTRUCTION EQUIPMENT

3026 WEST CONCORDIA AVENUE
MILWAUKEE 10, WISCONSIN
FOUNDRY DIVISION - 3043 W. LOCUST ST.

October 16, 1956

Federal Foundry Supply Co.
4600 East 71st Street
Cleveland 5, Ohio

Gentlemen:

We have been so pleased with our Model 40-P1-LPP San-Blo Core Blower, which was installed in our core room some six months ago. Since that time, it has been used for cores ranging in weight from 2 lbs. to approximately 40 lbs. In all cases, wooden core boxes were used.

To cite examples of what this core blower has done for us--it has effected considerable savings in core making costs, both in actual making time and eliminating the necessity of overtime. The savings have enabled us to pay for the machine in the six months it has been in operation. Among its many advantages are a more uniform core density, the use of existing core box equipment, reduction in use of core rods and increase in production.

The flexibility and simplicity of the San-Blo Core Blower makes it unique in its field, and therefore we are contemplating purchasing the "155" Model San-Blo, which will enable us to further reduce our costs and increase our core production.

Very truly yours,

KOEHRING COMPANY
Foundry Division

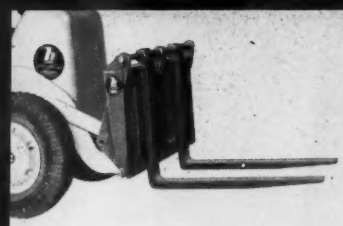
L. Hayden
Manager

LH:dk

FEMA

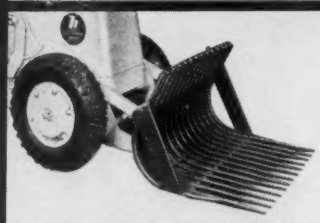
The FEDERAL FOUNDRY SUPPLY Company 4600 EAST 71st STREET · CLEVELAND 5, OHIO

# Foundry Handyman



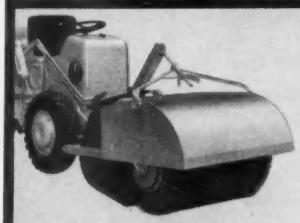
**FORK LIFT**

Handles all kinds of palletized and unit loads . . . lifts and stores skids, boxes, barrels, crates . . . loads finished products.



**CASTINGS BUCKET**

Picks-up, handles and moves scrap and small parts . . . combs castings out of molds and delivers to shakeout or grinding room.



**PICK-UP SWEEPER**

Easily attaches to standard bucket . . . has its own powered broom. Cleans aisles and work areas . . . carries and dumps its own load.

## It hauls . . . lifts . . . carries . . . stacks . . . sweeps

Looking for a low-cost method to mechanize all your material handling work? With easily interchanged front-end attachments, there's no limit to the usefulness of one basic Model HA "PAYLOADER". Around molding stations, mixers, shakeout floors, cleaning rooms and outside yard and storage areas, a "PAYLOADER" tractor-shovel travels and handles tons of sand, supplies and finished products with one-machine economy.

Smallest of the "PAYLOADER" line, the Model HA is available with bucket sizes ranging from 9 to 36 cu. ft. — depending on weight of material (2,000 lbs. carry capacity). Its compactness, speed and easy maneuverability permits the HA to move in and out of cars, up and down narrow aisles and ramps, and work in close quarters.

Other important HA "PAYLOADER" operating features: rear wheel steering . . . 40° bucket roll-back at ground level . . . exclusive one-lever bucket control . . . torque converter drive . . . two speeds in either direction.

**THE FRANK G. HOUGH CO.**
703 Sunnyside Ave., Libertyville, Ill.
Send full "PAYLOADER" information on:

- ☐ Model HA (9 to 36 cu. ft.)
- ☐ Larger models

Name _____

Title _____

Company _____

Street _____

City _____ State _____

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**On-job Demonstration**

The nearby Distributor will be glad to show you what a "PAYLOADER" with useful extra attachments can do for you — call him today!

SAY "NUFF"

**PAYLOADER®**

MANUFACTURED BY
**THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.**
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

*Circle 580 on Inquiry Card—Page 51*

# Late News

(As of May 27, 1957)

**SEE BUSINESS RISE:** Most purchasing executives expect better business for the balance of 1957 than it has been to date. The monthly business survey of the National Association of Purchasing Agents shows that 40 per cent of the group's members look for an upturn, 23 per cent see no change and 37 per cent expect a drop. The survey also indicates that the upturn in commodity prices has been halted largely by competitive conditions, employment is a trifle better, inventories still are shrinking, and buying for a shorter distance ahead is more pronounced.

**BDSA MAY SHRINK:** Restoration by the Senate of part of the cut made by the House in the Business & Defense Services Administration budget will leave the agency operating with considerably less than the funds it asked for originally. This assumes that the House goes along with the Senate Appropriations Subcommittee and reverses its former action. The matter currently is in conference. The House originally cut the BDSA budget by $3.5 million and the Senate put back $2.1 million.

**SUPPLIES MERGER:** Archer-Daniels-Midland Co., whose Foundry Products Division is located in Cleveland, is negotiating for acquisition of Federal Foundry Supply Co., Cleveland. A-D-M, a leading producer of core oils and other sand binders, at present does not produce or sell the types of products in which Federal specializes—bentonite, seacoal, core washes, parting compounds, and core blowing machines. Federal operates bentonite mines in Wyoming as well as plants in Chicago and Hansford, W. Va., and warehouses in six cities.

**SCRAP EXPORTS:** Commerce and State departments continue to seek ways to satisfy foreign buyers of U.S. iron and steel scrap and still prevent the impending shortages of quality scrap predicted by the recent Commerce department study. Japan already has taken as much heavy melting steel as it received in all of 1956 and under Commerce's ruling is eligible for no more of that grade this year. European countries have scaled their purchases more nearly in line with the 1956 pace. Meanwhile the government is trying to induce foreign users to look elsewhere for scrap and to depend more on basic metallics.

Domestic prices on ferrous scrap have advanced moderately for several weeks, following an extended decline which started last December. Current prices are near those prevailing a year ago.

**BUYS VERMONT FOUNDRY:** Bathgate Foundries Co., North Grafton, Mass., has purchased Vermont Foundries Inc., Springfield, Vt., a subsidiary of Fellows Gear Shaper Co. James and Peter Bathgate are owners of Bathgate Foundries. Vermont Foundries buildings on the west side of Black River will remain in possession of Fellows Co. Foundry operations will be moved gradually to the east bank facilities, and extensive improvements will be made to the plant.

**WHEEL FOUNDRY OPENS:** Griffin Wheel Co., subsidiary of American Steel Foundries, Chicago, has begun production of cast steel wheels for railway freight cars at its new plant in Colton, Calif. Griffin also manufactures these wheels at plants in Chicago and in St. Hyacinthe, Quebec, Canada. Eight other Griffin plants produce chilled iron wheels for railroads.

**ALUMINUM SLOWER:** Primary aluminum production during April was 138,728 tons, a little under the 144,727 tons produced during April, 1956. Total 1957 production through April was 540,523 tons, compared with 563,778 for the same period in 1956.

**PERSONALS:** John W. Coffey, formerly with Gunite Foundries Corp., Rockford, Ill., has been appointed chief metallurgist, Foundry Division, Hansell-Elcock Co., Chicago . . . Willard C. Suttles has been appointed sales representative for Beardsley & Piper, Div. of Pettibone Mulliken Corp. . . . Henry Present has

City State

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been made director of engineering and metallurgy, Jelrus Precision Casting Corp., New York . . . Edward E. Slowter, with Battelle Memorial Institute since 1936, has been elected vice president . . . Robert H. Merrill, General Electric Co., Bridgeport, Conn., is on leave to serve as director, Copper Division, BDSA, Washington.

**PELTON EXPANDS:** A two-year expansion program planned by Pelton Steel Casting Co., Milwaukee, eventually will increase the company's castings production 45 per cent at a cost of more than $600,000. Plans call for an addition of 44,000 sq ft to the plant, which presently has about 133,000 sq ft of space. The expansion will add about 300 tons a month to the current capacity of 650 to 700 tons.

**FOUNDRIES MERGE:** Milwaukee Bronze Casting Co. will merge with Allis Foundry Products Inc. Both are in Milwaukee. The new firm will take the name of Allis Foundry Products Inc., but will consolidate operations at the Milwaukee Bronze plant. John H. Kamin, president of Milwaukee Bronze, will head the new company. Robert A. Hipke, vice president of Milwaukee Bronze, and Philip C. Hanson, president of Allis, will be vice presidents. Walter R. Matschulat, former secretary-treasurer of Milwaukee Bronze, will hold the same post in the new firm.

**MISCELLANY:** The Malleable Research & Development Foundation, formed last fall, has opened its offices in Granville, O. President is William E. Mahin, former technical director, Vanadium Corp. of America. . . . Linde Co. Division of Union Carbide Corp. is the new name of the former Linde Air Products Co., division of Union Carbide & Carbon Corp. . . . American-Marietta Co. has acquired Guardite Inc., Chicago, which recently acquired Hydro-Blast Corp., Chicago. Hydro-Blast Corp. is a manufacturer of foundry equipment . . . Billings by members of the Metal Treating Institute were $3,571,600 during March, 7.2 per cent larger than a year ago. The first quarter was 8.7 per cent ahead of 1956 . . . One of the entries in the 500-mile Memorial Day race at Indianapolis had motor mounts made of cast magnesium. Wheels on all Indianapolis racers in recent years have been magnesium sand castings . . . Air Reduction Co., New York, plans a $3 million addition to its Lorain, O., plant for production of gaseous and liquid oxygen.

# Prices of Foundry Metals and Coke

(As of May 27, 1957)

## FOUNDRY COKE

(Per net ton, f.o.b. ovens)

| | |
|---|---|
| **BEEHIVE** | |
| Connellsville | $17.50-18.50 |
| **OVEN** | |
| Birmingham | $28.85 |
| Buffalo | 30.50 |
| Detroit | 30.50 |
| Erie, Pa. | 30.50 |
| Indianapolis | 29.75 |
| Kearny, N. J. | 29.75 |
| Milwaukee | 30.50 |
| Montreal, Que. | 31.00 |
| Neville Island (Pittsburgh) | 29.25 |
| New England, deld. | 31.55 |
| Painesville, O. | 30.50 |
| Philadelphia | 29.50 |
| St. Louis | 31.50 |
| St. Paul | 29.75 |
| Swedeland, Pa. | 29.50 |
| Terre Haute, Ind. | 29.75 |

## PIG IRON

(Per gross ton f.o.b. furnace)

| | No. 2 Foundry | Malleable |
|---|---|---|
| Birdsboro, Pa. | $67.00 | $67.50 |
| Birmingham | 59.00 | 63.00 |
| Buffalo | 65.00 | 65.50 |
| Chicago | 65.00 | 65.00 |
| Cleveland | 65.00 | 65.00 |
| Duluth | 65.00 | 65.00 |
| Erie, Pa. | 65.00 | 65.00 |
| Everett, Mass. | 66.50 | 67.00 |
| Fontana, Calif. | 73.00 | .... |
| Geneva, Utah | 65.00 | .... |
| Granite City, Ill. | 66.90 | 67.40 |
| Neville Island (Pittsburgh) | 65.00 | 65.00 |
| Swedeland, Pa. | 67.00 | 67.50 |
| Toledo, O. | 65.00 | 65.00 |
| Troy, N. Y. | 67.00 | 67.50 |
| Youngstown, O. | .... | 65.00 |

## NONFERROUS INGOT

(Cents per pound, carlots)

**BRASS AND BRONZE:** Red brass, No. 115, 30.50; tin bronze, No. 225, 40.00; No. 245, 34.50; high-leaded tin bronze, No. 305, 34.50; No. 1 yellow, No. 405, 28.00; manganese bronze, No. 421, 28.00.

**ALUMINUM:** 99 per cent plus primary ingots 27.10. Secondary No. 12 alloy 21.00-22.00. Deoxidizing grades: No. 1, 22.75; No. 4, 19.25.

**MAGNESIUM:** 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

**COPPER:** Electrolytic 32.00, delivered Connecticut valley.

**ZINC:** High grade 12.85 delivered. Die casting alloy No. 3, 15.50; No. 2, 16.50, delivered.

## IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

| | No. 1 Heavy Melting Steel | No. 1 Cupola Cast | Heavy Breakable Cast | Clean Auto Cast | Machinery Cast | Malleable | Short Steel Rails |
|---|---|---|---|---|---|---|---|
| Birmingham | $39.00-40.00 | **$47.50-48.50 | ..... | ..... | ..... | ..... | **$58.00-59.00 |
| Boston* | **37.00-38.00 | **34.00-35.00 | ..... | ..... | **42.00-43.00 | ..... | ..... |
| Buffalo | 40.00-41.00 | **41.00-42.00 | ..... | ..... | **46.00-47.00 | ..... | **59.00-60.00 |
| Chicago | 43.00-44.00 | 42.00-43.00 | ..... | 47.00-48.00 | 47.00-48.00 | 55.00-56.00 | 61.00-63.00 |
| Cincinnati* | **37.00-38.00 | **43.00-44.00 | **42.00-43.00 | ..... | **55.00-56.00 | ..... | **64.00-65.00 |
| Cleveland | 38.00-39.00 | 48.00-49.00 | 37.00-38.00 | 48.00-49.00 | 50.00-51.00 | 56.00-57.00 | 69.00-71.00 |
| Detroit* | **37.00-38.00 | 45.00 | 36.00 | 47.00 | ..... | 52.00 | ..... |
| Los Angeles | 46.00 | **54.00 | ..... | ..... | ..... | ..... | ..... |
| New York* | 46.00-47.00 | 43.00-44.00 | 46.00-47.00 | ..... | ..... | ..... | ..... |
| Philadelphia | 52.00 | 46.00 | 55.00 | ..... | 57.00-58.00 | 62.00 | 67.00-69.00 |
| Pittsburgh | 45.00-46.00 | 46.00-47.00 | 43.00-44.00 | ..... | 55.00-56.00 | ..... | 67.00-69.00 |
| St. Louis* | 41.00 | 43.00 | 37.00 | 48.00 | ..... | ..... | 61.00 |
| San Francisco | 48.00 | 55.00 | 42.00 | 57.00 | 55.00 | ..... | ..... |
| Seattle | 48.00 | 50.00 | 48.00 | ..... | ..... | ..... | ..... |

*Brokers' buying prices. **F.o.b. shipping point

# *Get the many advantages of*

# DUST-FREE, MONEY-SAVING

# HYGEIA

**SEACOAL, PITCH**

Originator of dust-free foundry facings, Penn-Rillton introduced HYGEIA Pitch and Seacoal four years ago. Since that time, hundreds of foundries have switched from dusty seacoal and pitch to dust-free HYGEIA. The advantages benefit every phase of foundry work, from the man who handles the material to the man who pays the bills. These are the advantages:

SMALLER LOSS OF MATERIAL There is almost no airborne loss of HYGEIA fines each time material is handled.

LESS HYGEIA IS USED You get better results with less HYGEIA.

BETTER CASTING FINISH Stability of seacoal fines permits use of finer grinds.

CLEANER HANDLING "The man at the muller shows more interest in his work. He likes HYGEIA!"

PERMANENTLY DUST-FREE The dustproof characteristics of HYGEIA Pitch and Seacoal are a permanent part of the particle until it is consumed in the casting process.

HYGEIA pays off in better working conditions, increased production, all-around economies. Why be satisfied with less?

*See Your Supplier or Write Direct*

***Ask for a demonstration of the HYGEIA Scatter Pattern***

P-R

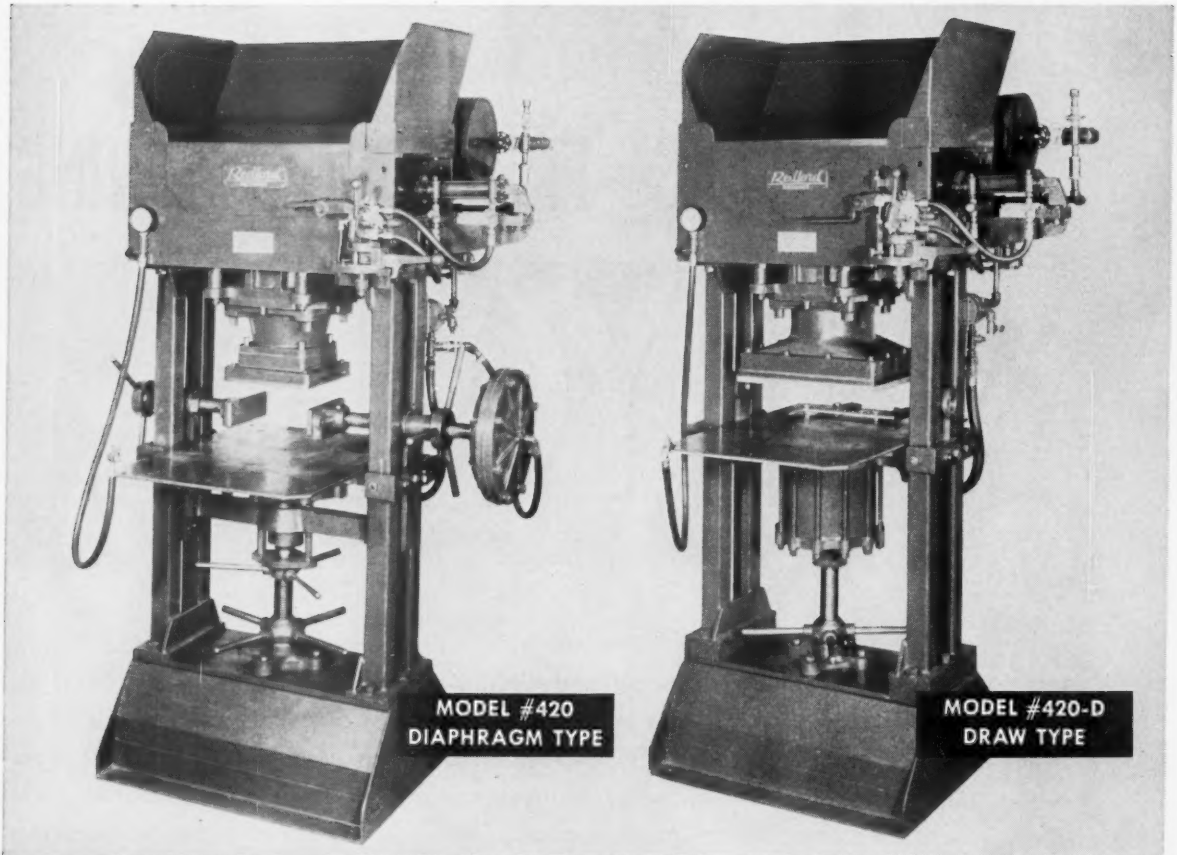
## PENN-RILLTON COMPANY

**324 West 23rd Street, New York 11, N. Y.**

**Manufacturers of:**
Faceamol Spray-On, Hygeia Seacoal, Hygeia Nu-Bond Pitch, Blended Core Compounds
PLANTS: Irwin and West Elizabeth, Pa.



*Circle 581 on Inquiry Card—Page 51*




# Redford CORE BLOWER AND CORE SHOOTER

Here is a core making machine that is setting new standards in versatility and performance. The #420 Redford is equipped to make cores up to 20# using any type binder. Proven core blowing practices may be continued to do the most intricate work and to assure maximum production. Tough sand mixes which do not readily lend themselves to blowing can be used in ramming or shooting cores.

There is nothing "Revolutionary or Amazing" about the practice of core shooting. Core shooting requires a fast acting machine having sufficient capacity to propel sand at high velocity through a large shoot head opening. The large shoot head opening offers little resistance to the flow of sand and allows any sand to be rammed into suitable open cavity core boxes ahead of the propelling air.

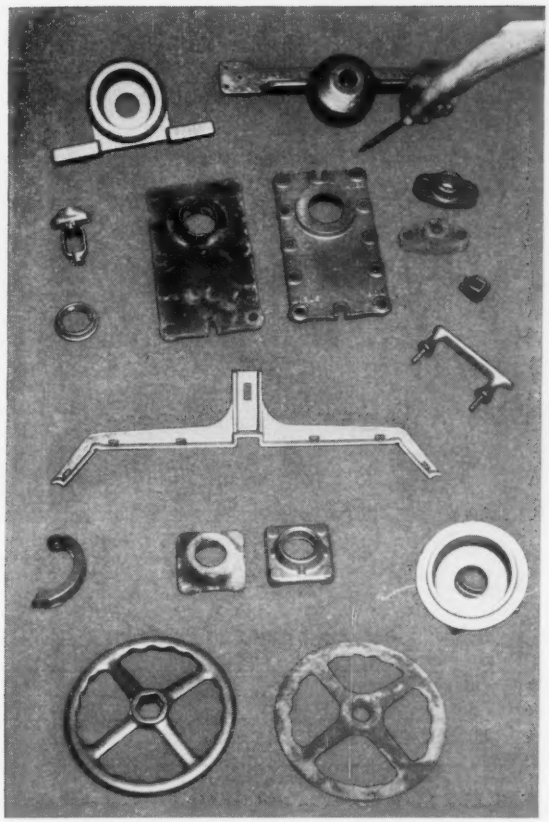
With the #420 Redford we offer a tool that allows you the widest choice of application. It is a properly balanced combination of standard Redford practices that makes possible a low cost machine of greater usefulness and versatility to meet today's core room requirements.

**Redford IRON & EQUIPMENT CO.**
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

*For Complete Information write for*
**BULLETIN #42**

# WHEELABRATOR®
## STEEL SHOT
*cuts abrasive costs for*
## *ALL TYPES*
*of foundries*

## GRAY IRON FOUNDRY
*reduces abrasive consumption*
75%



Castings shown here before and after cleaning illustrate the thorough cleaning accomplished with Wheelabrator Steel Shot.

Cleaning an average of 13 tons of gray iron castings a day, the Plainville Castings Co., Westfield, Mass., used to consume 100 lbs. of chilled iron shot every day and 200 lbs. of malleable iron shot every week.

On the basis of a 4-week month this adds up to a total of 2,800 lbs. of abrasive per month. With Wheelabrator Steel Shot, the heat treated electric furnace steel shot, the same amount of cleaning is accomplished with only 400 to 500 lbs. per month.

Besides achieving these outstanding reductions in shot consumption and shot costs, Wheelabrator Steel Shot also provides "a beautiful finish, in comparison to the other abrasives," according to Joe Stopski, Foundry Superintendent. "We also find that our maintenance costs are lowered" the superintendent adds.

Wheelabrator Steel Shot is bringing savings in abrasive consumption, abrasive costs maintenance expense sive consumption, abrasive costs, maintenance expense ries. Why don't you let this versatile shot save for you, too?

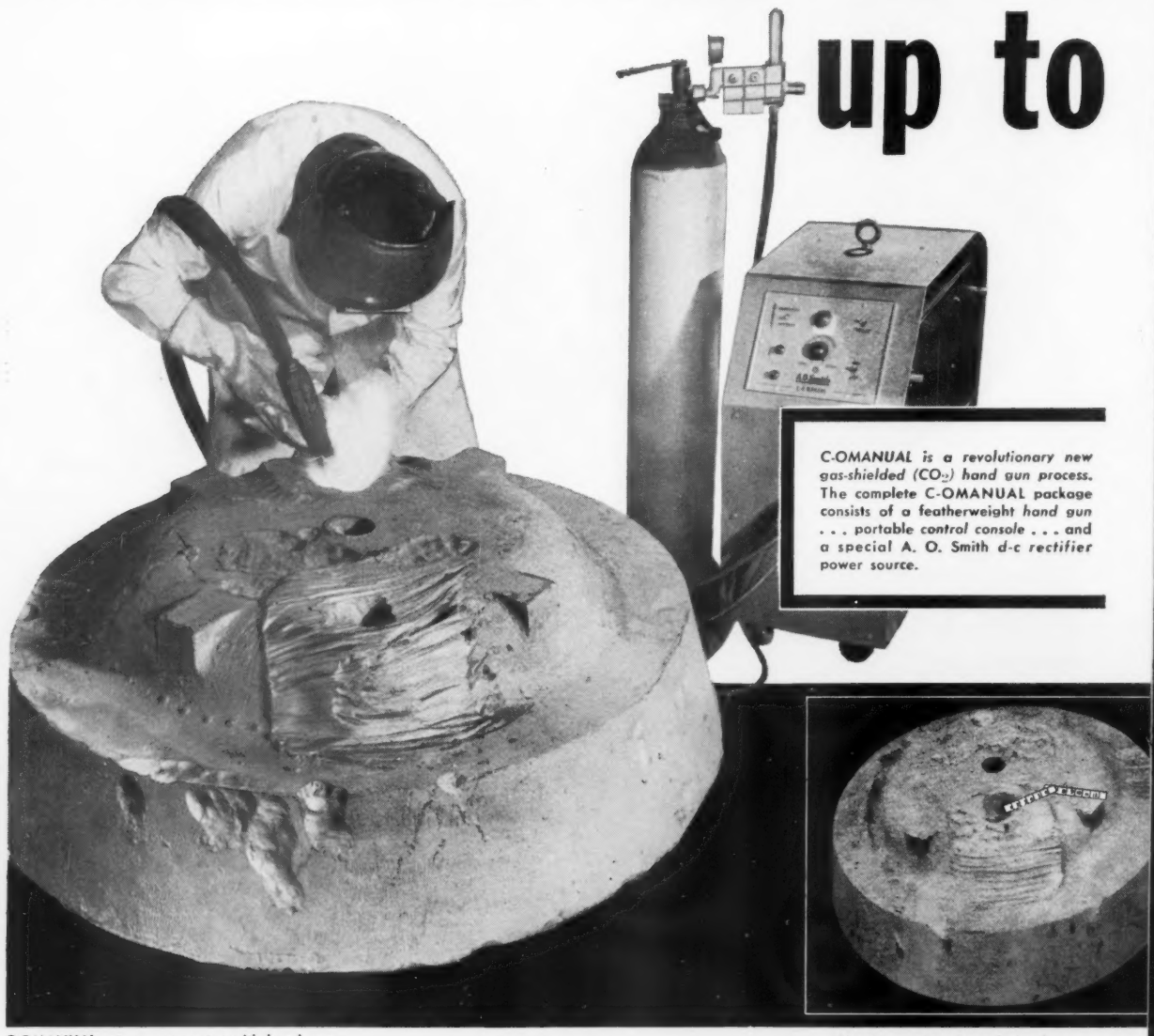
*Write today for your free copy of Bulletin 89-B for more information on Wheelabrator Steel Shot.*

**WHEELABRATOR**
CORPORATION

505 South Byrkit Street Mishawaka, Indiana

# Midwestern foundry salvages castings...

# up to



*C-OMANUAL is a revolutionary new gas-shielded ($CO_2$) hand gun process.* The complete C-OMANUAL package consists of a featherweight *hand gun* . . . portable *control console* . . . and a special A. O. Smith *d-c rectifier* power source.

C-OMANUAL setup — operator with hand gun, portable remote control console and A. O. Smith 600 amp d-c rectifier not visible in illustration.

Here's a casting, imperfect to be sure, but economically salvageable thanks to low-cost, high-speed C-OMANUAL.

## *Typical comparison of C-OMANUAL and Hand Arc operations in a foundry*

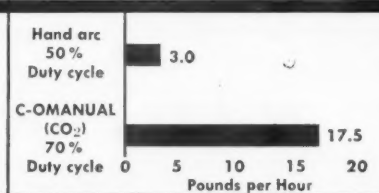
**PROBLEM:** Repair and build up large steel casting.

| | C-OMANUAL ($CO_2$) | E-6013 HAND ARC |
|---|---|---|
| Wire Diameter | 1/16" | ¼" |
| Amperes | 450 | 315 |
| *Duty Cycle % | 70 | 50 |
| †Efficiency % | 98 | 65 |

***DUTY CYCLE** — Lower on hand arc due to necessary stops for slag removal, electrode changes, etc.

†**EFFICIENCY** — Lower on hand arc due to coating loss, stub loss, spatter, etc.

**DEPOSITION RATES**




**477% INCREASE in metal deposited with carbon dioxide**

## *puts down metal at rates*

# ½ lb. per minute!

## *with A. O. Smith* C-OMANUAL

When it comes to building up blowholes and other imperfections in castings, foundries are "sold" on C-OMANUAL. They're putting down metal at rates up to 30 lbs. an hour where with previous methods they put down three to five lbs. per hour.

**Fast, easy, accurate** — With C-OMANUAL, the operator works with a light-weight, perfectly balanced hand gun. He has the advantages of visible arc welding — spotting the nozzle's a cinch. And there's no flux to clean, no chipping, no scraping necessary. You can start at the bottom and work right to the top—without stopping. The C-OMANUAL control console automatically adjusts arc length too . . . compensates for distance variations.

**Uses lowest cost gas** — With C-OMANUAL, the carbon dioxide for shielding the arc costs only one cent per cubic foot and uses approximately 30 cubic feet per hour.

**Seeing is believing** — For complete details on how C-OMANUAL is helping foundries get an entirely new concept of low cost and high speed in casting salvage — contact your "man from A. O. Smith." He'll be happy to arrange for a demonstration, let you judge for yourself why C-OMANUAL is one of the "hottest" new advances in welding history!

Closeup of typical crater to be filled — diameter approximately 7 inches . . . depth 4 inches.

Rebuilt casting before grinding. Note absence of slag. Deep penetration and weld quality are assured.

Completed casting. On jobs such as this, C-OMANUAL puts down weld metal at least 5 times faster than conventional electrodes.

**COST TO DEPOSIT 100 LBS. OF WELD METAL**

| | SEMI-AUTOMATIC C-OMANUAL ($CO_2$) | E-6013 HAND ARC |
|---|---|---|
| ELECTRODE WIRE | $29.07 (.285) | $20.80 (.135) |
| POWER | 1.54 | 4.95 |
| GAS | 1.71 | |
| WELD LABOR (3.00 per hr.) | 17.10 | 99.00 |
| BURDEN (5.00 per hr.) | 28.50 | 165.00 |
| TOTAL | $77.92 | $289.75 |

**A saving of $211.83 for each 100 lbs. of weld metal deposited**

*Through research* A.O. Smith Welding Smith *. . . a better way*

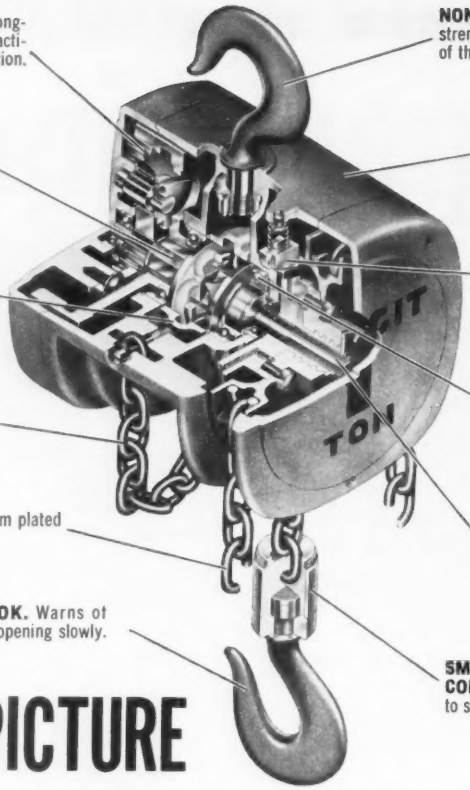
**A.O.Smith**

CORPORATION

**WELDING PRODUCTS DIVISION**

Milwaukee 1, Wisconsin

International Division: Milwaukee 1, Wisconsin




**EQUA-TORQUE GEARING.** Strong, long-life, alloy heat-treated steel. Turns practically every ounce of effort into lifting action.

**SPLINED FASTENINGS.** No keys or keyways to wear. Makes maintenance easy.

**LOAD CHAIN GUIDE.** Completely surrounds load wheel. Prevents chain wedging or jamming regardless of angle of pull.

**LOAD CHAIN.** Special alloy steel, heat treated. So strong it cannot be cut with ordinary hacksaw.

**HAND CHAIN.** Specially cadmium plated to resist rust.

**SAFE-GUARD LOAD HOOK.** Warns of danger when overloaded by opening slowly.

**NON-FRACTURING TOP HOOK.** High strength. Several times the rated capacity of the hoist. Swivels freely.

**FRAME AND COVERS.** Light weight, tough aluminum alloy that takes hard knocks. Seals out dust, dirt, grit.

**AUTOMATIC LOAD BRAKE.** Large ratchet wheel and pawl are heat-treated steel. Reduces pull needed to lower loads; speeds up lowering.

**ANTI-FRICTION BEARINGS THROUGHOUT.** Assure smooth, easy operation and long service life.

**SHAFTS.** High alloy steel, heat treated for extra strength, longer life.

**SMOOTH CONTOUR LOAD HOOK CONNECTION.** Strong. Permits hook to swivel freely.

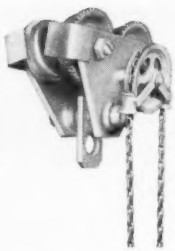
# REVEALING PICTURE

## OF A COST CUTTER

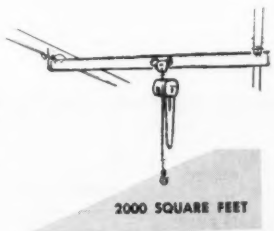
This is the 'Budgit' Aluminum Chain Block. It is distinctive in through-and-through quality. Toughness is matched by efficiency—one man can lift a 500 lb. load with only 25 lbs. of muscle effort. The ½-ton size weighs a mere 29 lbs. Carry-around lightness makes the 'Budgit' a favorite for emergencies, construction and maintenance as well as for production lifting.

The quality of the 'Budgit' Aluminum Chain Block means money-saving service plus complete safety for man, load and hoist. Capacities: ¼ to 10 tons, including spark-resistant models for use where such a safeguard is essential. Reduce worker fatigue and speed hoisting operations. You can do it with a 'Budgit'. *Call your "Shaw-Box" Distributor for details or write us for Bulletins 405 and 415.*

**'Budgit' I-Beam Trolleys** are available in standard and spark-resistant designs. Adjustable to fit various sizes of I-beams. Bearing-equipped wheels assure smooth, easy travel. Push type and hand geared models in capacities to 10 tons.



**Safety Hooks** are available to "lock in" slings and other attachments used to support loads. All capacities can be supplied as original hoist equipment — easy to install on 'Budgit' Chain Blocks already in service.




**'Budgit' Bridge Crane Assembly No. 62** increases the work area of a single hoist as much as 100 times. It is typical of numerous low-cost "packaged" crane assemblies available for erection on the site with common tools.

57C-5

MAXWELL MANNING MM&M MOORE INC TRADE MARK

## 'Budgit'® CHAIN BLOCKS

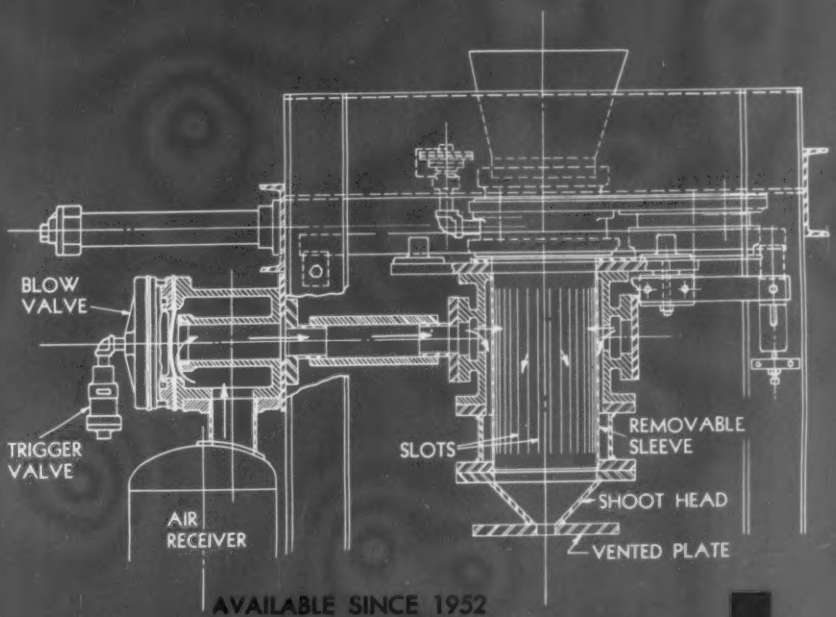
**MANNING, MAXWELL & MOORE, INC.**

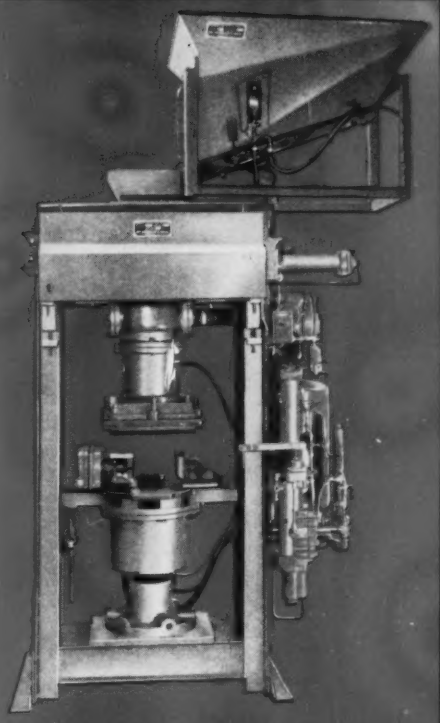
SHAW-BOX CRANE & HOIST DIVISION

386 West Broadway • Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

*In Canada: Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.*



AVAILABLE SINCE 1952

#101-EO DEMMLER CORE BLOWING MACHINE

This machine may be used for shooting cores by substituting a shoot head for the standard blow plate.

Best quality cores are often produced by the time tested blowing method, and when it is preferred to use the machine as a blower the change can be made quickly and conveniently.

These are the same type machines as the successful Demmler mold blowers which have been breaking molding records for the past three years.

Yes, you can have a machine that gives you complete flexibility, to blow or shoot as you choose. Write us for complete data on this Demmler 101-E machine.

# DEMMLER

**FIRST NAME IN CORE BLOWERS**

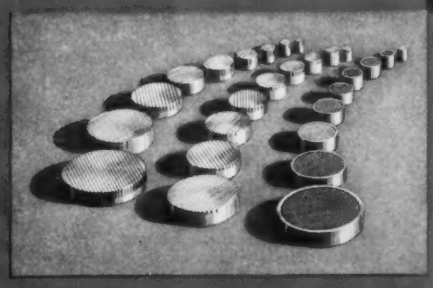
# ONE MACHINE DOES BOTH .....BLOWS OR SHOOTS CORES

**PRECISION CORE BOX VENTS**

Demmler is by-far your best source for precision core box vents, manufactured by specialists who pioneered in the core blower industry. Many sizes, slot widths and screen meshes are available in brass and steel core box vents.

**NEW *HL* *150 Mesh Vents***

A new general purpose vent which practically eliminates the cleaning coarser screens demand. Write for literature on Demmler vents.



**DEMMLER MANUFACTURING CO.**

**KEWANEE, ILLINOIS**

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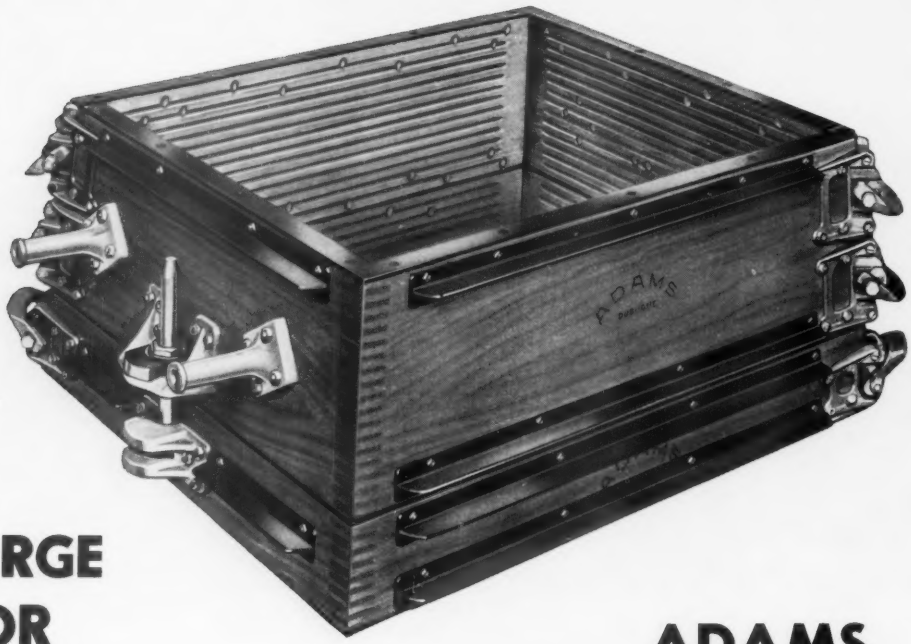
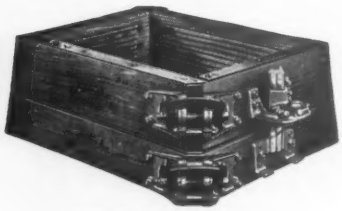


# LARGE OR SMALL



Patent No. 2393200
Other Patents Pending

ADAMS CHERRY
EASY-OFF FLASK

**PIN AND EAR ARRANGEMENT SUPPLIED TO SUIT YOUR PRESENT PATTERN PLATE GUIDES**

**Write us today for our circulars on Cherry Easy-Off Flasks and Cast Iron or Aluminum Jackets.**

# ADAMS CHERRY EASY-OFF FLASKS

## with ADAMS JACKETS

**CAST IRON OR ALUMINUM**

To Complete

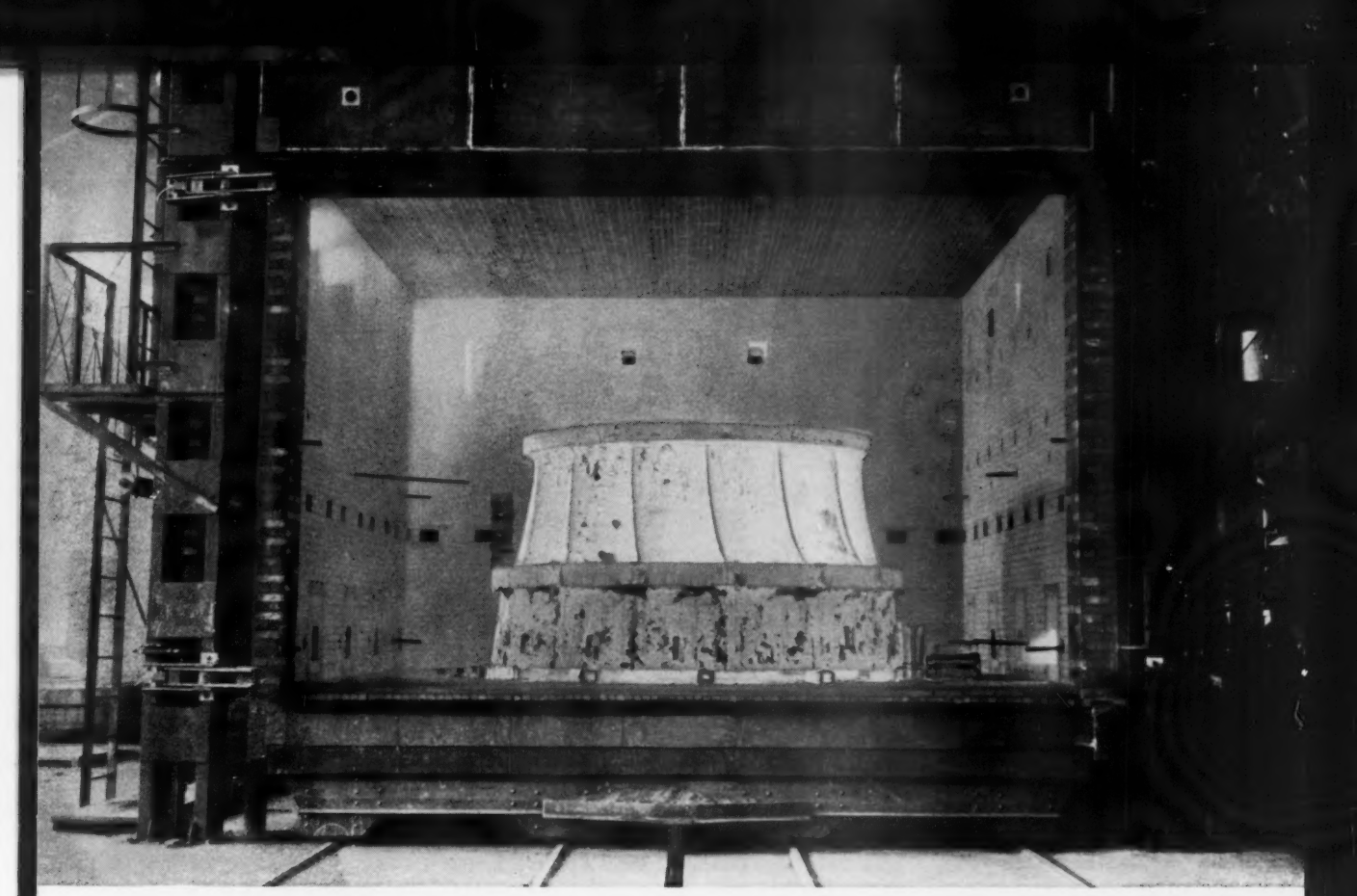
a winning combination

# The ADAMS Company

**ESTABLISHED 1883**

**MOLDING MACHINES and FLASK EQUIPMENT**

**700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.**



*For best performance and maximum economy*

# 7 different specialized refractories used in annealing furnace lining

Engineering a furnace lining with *specialized* refractories can save dollars on construction, fuel and maintenance as well as extend productive working time. To achieve these results, seven different B&W refractories were used in the lining of this 25′ x 23′ x 14′ annealing furnace.

Fuel savings and close temperature control were made possible by using three types of *lightweight* B&W Insulating Firebrick. Walls are composed of *B&W K-23 IFB* backed up with *B&W K-16*. Because of the proximity of the burners, the roof was constructed of *B&W K-26 IFB*, a higher temperature brick to guard against the effect of possible localized overheating.

The weight saving construction means about 100 lb less refractory material to heat up per sq ft than with ordinary firebrick, or about 28 tons less in the roof of the furnace. Furthermore, supporting steel is less massive, far less costly. Commercial size steel can be used for roof suspension instead of special steels.

To eliminate the need for expensive special shapes, the burner tunnels are formed of *B&W's 3000 F refractory castable, Kaocast*. Lintels over the burners and jambs are constructed of rugged *B&W Junior Firebrick*.

To take advantage of fast, easily installed castable construction, *B&W Kaocrete-D* was used in the nose arch (separately pictured). This sturdy castable with a 2500 F use limit was selected to provide strong resistance to abrasion caused by door operation. In addition, the need for costly fired shapes and their supporting castings was eliminated, as was a great deal of expensive engineering detailing.

Nose arch, cast of B&W Kaocrete D, immediately after removing forms.

The car top is insulated with *B&W Kaolite-20*, a 2000 F insulating refractory concrete.

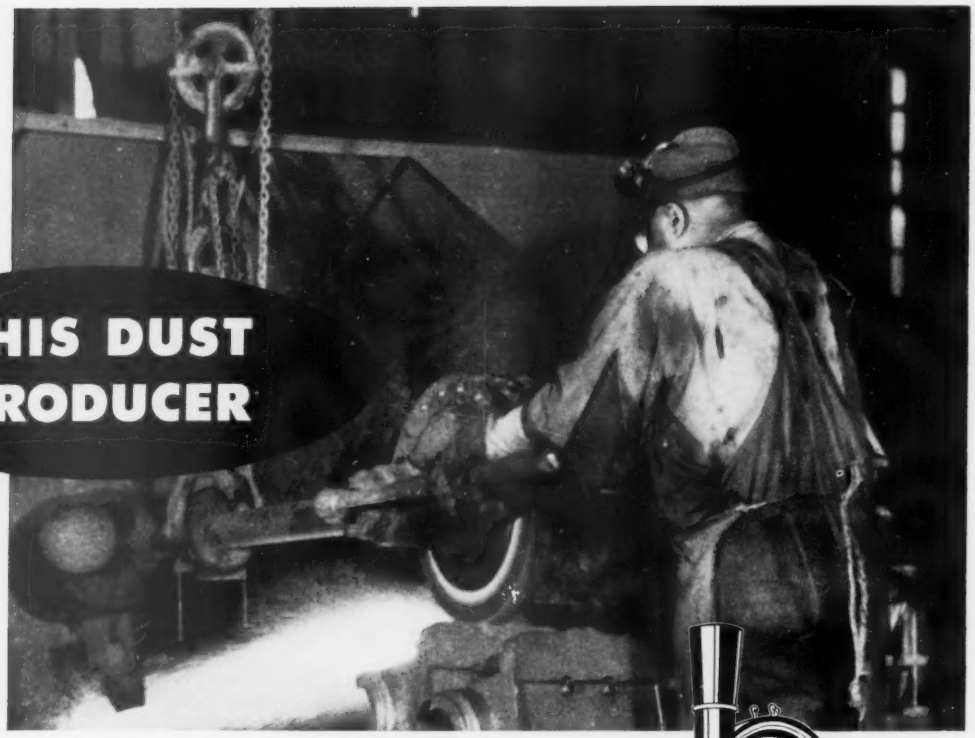
For further information, write for B&W bulletin R-2-H on insulating firebrick and B&W bulletin R-35 on castables.

**BABCOCK & WILCOX**

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

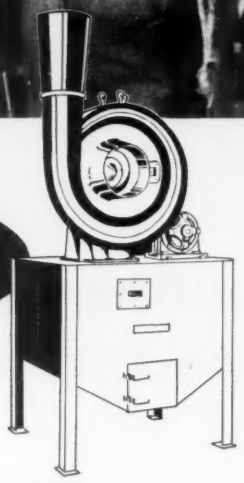
R-574

Circle 588 on Inquiry Card—Page 51



# THIS DUST PRODUCER

## meets its master in THIS DUST COLLECTOR



## AAF Type D ROTO-CLONE takes the grime out of grinding!

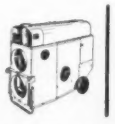
Grinding dust is the favorite diet of AAF's dust-devouring dynamic precipitator, the Type D ROTO-CLONE. Whether the grinder is a swing frame, snag or portable, the dust meets the same fate—instant extinction. This means lower maintenance costs, better employee and community relations.

The Type D draws in the dust-laden air, delivers the collected material to the storage hopper, and expels the clean air—all in a single operation with only one moving part: the impeller. Exhauster and separator are combined in a compact, self-contained unit.

For complete product information on the Type D ROTO-CLONE, call your local AAF representative or write direct for Bulletin 272.

AAF herman nelson **American Air Filter** COMPANY, INC.

266 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.



Herman Nelson Portable Heaters

Illinois Heating Specialties

BETTER AIR IS OUR BUSINESS

AAF Electric Furnace Hoods

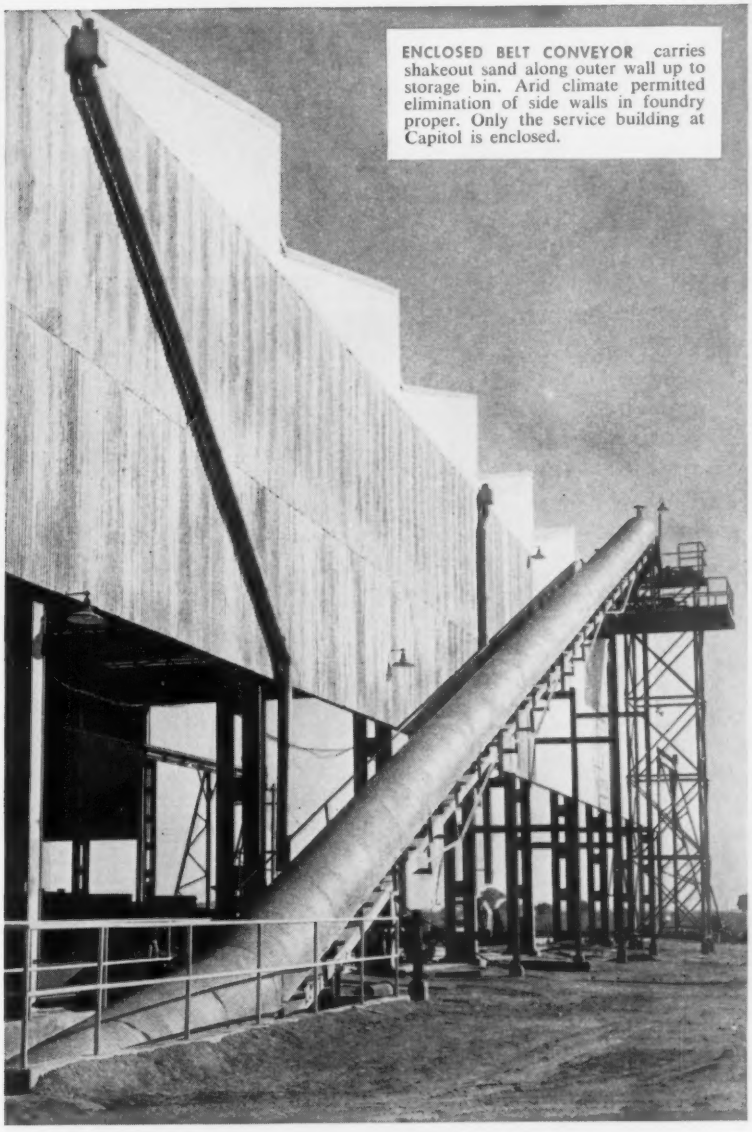
AAF Type K Exhauster



Circle 589 on Inquiry Card—Page 51

**LINK-BELT furnishes closed-circuit sand handling for**

# "open air" foundry



**ENCLOSED BELT CONVEYOR** carries shakeout sand along outer wall up to storage bin. Arid climate permitted elimination of side walls in foundry proper. Only the service building at Capitol is enclosed.

**SAND REVIVIFIER** disintegrates, blends and cools shakeout sand before distribution to molding stations. Fluffy, aerated sand rams to a uniform density in the molds.

**DISCHARGE PLOWS** on overhead distributing belt conveyor deflect prepared sand to molders' hoppers directly below. Link-Belt system recirculates 40 tons of sand per hour.

## System efficiently re-processes shakeout sand

WORK-SAVING mechanization . . . full utilization of space . . . low-cost efficiency—Link-Belt sand handling and preparation equipment provides all these benefits for Capitol Foundry Division's unique plant at Phoenix, Ariz. In addition, Capitol—a subsidiary of National Malleable and Steel Castings Co.—relies on Link-Belt's closed-circuit system for continuous re-processing of shakeout sand to comply with anti-dumping irrigation laws.

Link-Belt offers you unmatched experience plus a broad line of materials handling and power transmission products to modernize any phase of your operation—or to equip a complete new plant. Our engineers can "tailor" a system to meet your exact space, capacity and operating requirements—properly integrated, correctly rated components for maximum efficiency . . . long, trouble-free performance.

For facts on products and services, contact your nearby Link-Belt office. Or write for Book 2423.

**LINK-BELT**

**CONVEYORS AND PREPARATION MACHINERY**

**LINK-BELT COMPANY:** Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14.588

MEMBER FEMA

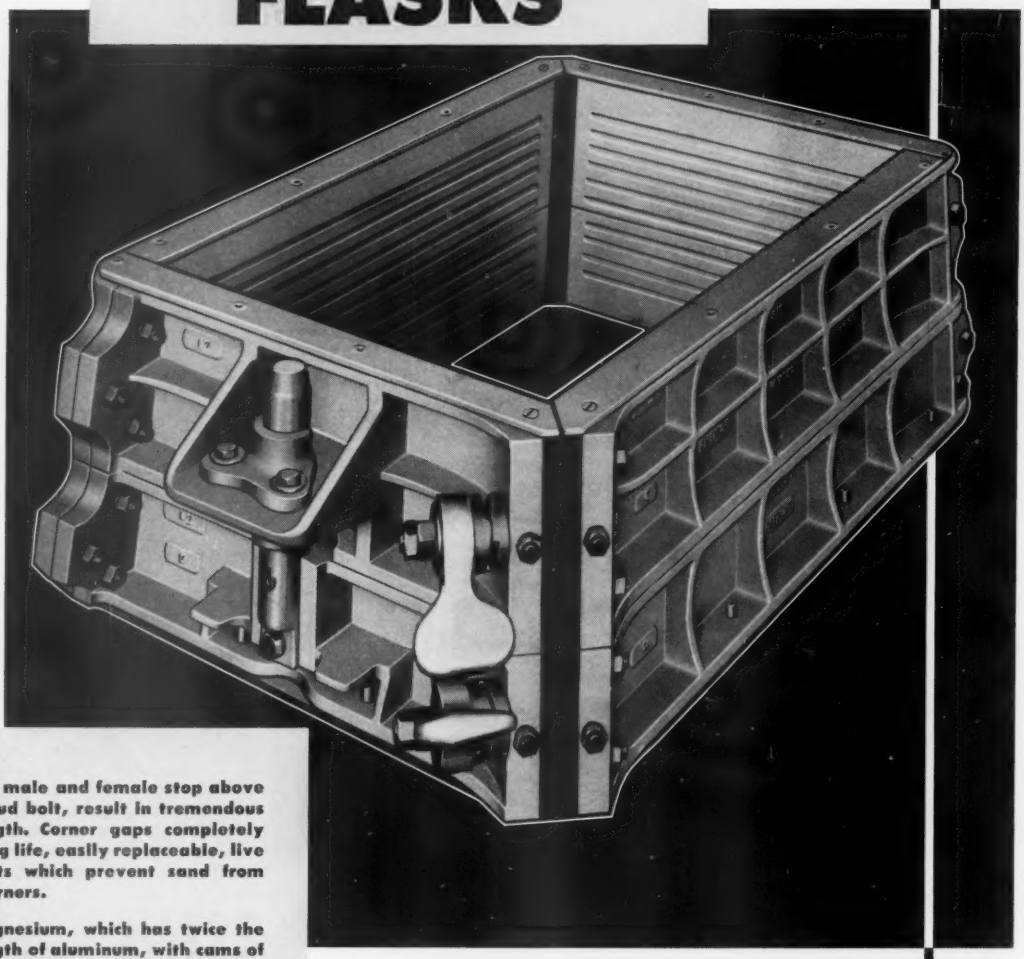


*Circle 590 on Inquiry Card—Page 51*

# No Other Flask Gives You All These Advantages

sturdy

## Fremont SPREADLOCK FLASKS



■ **Two-piece male and female stop above and below stud bolt, result in tremendous corner strength. Corner gaps completely closed by long life, easily replaceable, live rubber inserts which prevent sand from lodging in corners.**

**Made of magnesium, which has twice the tensile strength of aluminum, with cams of hardened steel forgings, the Spreadlock assures long service.**

**Magnesium weighs ⅓ less than aluminum, so they are light in weight, easier to handle.**

**Accurately machined inside surfaces and flanges, and steel-faced top and bottom flanges assure exacting work.**

*Write today for free literature and prices.*

## *The Fremont* FLASK Co.

**FREMONT, OHIO**



Circle 591 on Inquiry Card—Page 51

Circle 592 on Inquiry Card→

# How to upgrade your iron without changing furnace practice

**Small additions of molybdenum, made right in the ladle, are the most practical way to add strength and toughness to gray cast iron. A good rule of thumb to follow is: 50 points of moly=7000 psi tensile strength.**

There's no need to interfere with your regular cupola operation when a job calls for high strength iron. Simple-to-make moly additions in the ladle provide needed strength, without any sacrifice in toughness. In fact, moly increases toughness at least as much as strength.

Moly helps, too, in obtaining uniform response to heat treatment, and in producing machinable, growth-resistant castings.

Remember: Moly additions upgrade your iron — with no change in the character of the charge, normal melting practice, or the base metal. For more information on why moly makes better cast iron, write for the series of bulletins "Why Moly Iron". Climax Molybdenum Co., Dept. 20, 500 Fifth Avenue, New York 36, N. Y.

**MOLY MEANS STRENGTH**

**0.25% Mo will increase tensile strength by about 3500 to 4000 psi**
**0.50% Mo will increase tensile strength by about 7000 to 7500 psi**
**0.75% Mo will increase tensile strength by about 10500 to 11000 psi**
**1.00% Mo will increase tensile strength by about 14000 to 15000 psi**

Section size 1.2 in. dia.

**CLIMAX MOLYBDENUM**

***Knight services include:***

Foundry Engineering
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**KNIGHT-ENGINEERED**

# Mechanization Has Increased Man-Hour Production 40%

Mechanization has brought increased production, improved quality control, better working conditions, and lower unit costs for this malleable foundry.

Working closely with the foundry's management, the Knight organization developed a coordinated mechanization program, based on the practical thinking and experience gained in more than many hundreds of foundry assignments. *This modern foundry is a good place to work.*

Knight engineers have a broad background in every phase of foundry layout, modernization, mechanization, materials handling, production and cost control, wage incentives, organization, and management.

Write for Bulletin 101 Professional Foundry Engineering.

EVIDENCE OF EXPERIENCE

## Lester B. Knight & Associates, Inc.

*Management, Industrial and Architectural Engineers*

MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC.

*549 W. Randolph St., Chicago 6, Ill.*

*917 Fifteenth St., N. W., Washington, D.C.*

*New York Office—Lester B. Knight & Associates, 375 Fifth Ave., New York City 16*



Circle 593 on Inquiry Card—Page 51

Circle 594 on Inquiry Card→

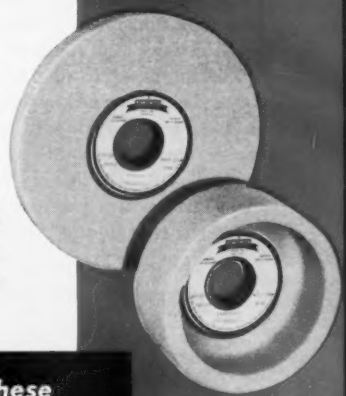
# Here's "What's NEW!" with SIMONDS ABRASIVE CO. GRINDING WHEELS

## NEW IL BOND ... for longer, faster, heavy-duty grinding

New IL Bond . . . it's in the grinding wheel mix. Special chemicals and compounds added to conventional resinoid bonds provide an *internal lubricant* to increase cutting action and prolong grinding wheel life. For ALL your snagging jobs!

## NEW DA Borolon® TRADE MARK ... abrasive for resinoid bonded snagging wheels

New DA Borolon . . . an improved, smaller crystal aluminum oxide abrasive for resinoid snagging wheels for floor stand and swing frame grinders . . . has more and sharper cutting edges, gives more production. Use with IL Bond described above.



## NEW SA Borolon® TRADE MARK ... abrasive for toolroom grinding wheels

New SA Borolon . . . a radically different, friable aluminum oxide abrasive with a unique *single* crystal formation that gives cooler, faster grinding and longer life. Ideal for tool and cutter grinding and horizontal surface grinding.

***Send for descriptive catalog bulletins on these new products. Ask for IL, DA or SA bulletins.***

**SIMONDS ABRASIVE COMPANY**

Tacony & Fraley Sts., Philadelphia 37, Pa.

*DIVISION OF SIMONDS SAW AND STEEL CO.*

BRANCHES: PHILADELPHIA • CHICAGO • DETROIT • LOS ANGELES
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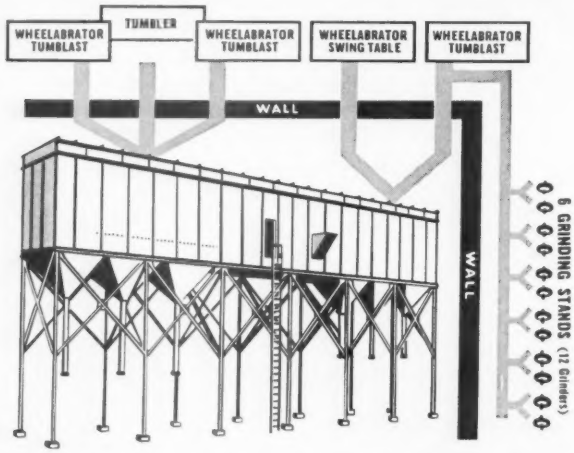
# DUST and FUME topics

**WHEELABRATOR CORPORATION** Mishawaka, Indiana




## WHEELABRATOR DUSTUBE® COLLECTORS VENTILATE CLEANING EQUIPMENT 5 YEARS WITHOUT DOWNTIME

A Dustube Collector at Howard Foundry, Semi-Steel Division, Chicago, ventilates six grinding stands and five pieces of casting cleaning equipment. In the first five years of operation not a single cloth tube or working part had to be replaced. The foundry manager reported: "In terms of efficiency and cost-saving performance, our Dustube is the best investment we have ever made."

## Illinois Foundry Achieves Nearly 100% Ventilation of Grinding Stands, Sprue Mill

Dust which formerly had escaped into the atmosphere is now collected with nearly 100% efficiency by a Wheelabrator Dustube Collector at Liberty Foundries Co., Rockford, Ill. In fact, a survey showed one of the lowest dust counts of all foundries in the state. The Vice President of the foundry says profit margins are greater because the Dustube costs less to operate and maintain.

## FOR MORE INFORMATION

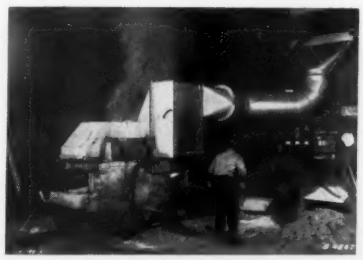
For the complete story on Wheelabrator Dustube, write today for Catalog 372-C.

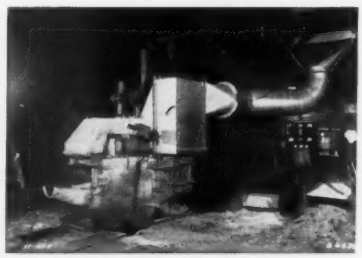
## AUTO SPECIALTIES SOLVES SHAKEOUT DUST PROBLEM

Hoods in under-floor sand tunnels gather dust particles from 3 shakeouts and carry them to a Dustube Collector at Auto Specialties Mfg. Co. The shakeouts and a sand mixer handle 94 tons of sand an hour and from these operations, 4 cubic yards of dust are trapped by the Wheelabrator Dustube each two-shift day.

## *Fume Control Saves Wear on Electric Furnace Parts*

Besides eliminating atmospheric pollution at Electrocast Steel Foundry Co., a special Wheelabrator Dustube Collector also has promoted longer life for various furnace parts by creating cleaner conditions on the pouring floor. Ventilating a 3-ton electric furnace, the collector traps approximately 40 pounds of dust and fume per heat — nearly 1,600 pounds each week. This keeps dust from settling on the furnace roof,





permitting the roof to dissipate heat as it should and resulting in 20% longer roof life. Copper buss bars that used to oxidize in 2 to 6 months now are expected to last 3 years. Besides saving on the cost of replacement parts, the longer life also saves on maintenance labor. The above pictures show how clean the furnace area is when the dust collector is operating.

**WHEELABRATOR**
CORPORATION

**505 S. Byrkit Street, Mishawaka, Indiana**

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June 1957

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| 524 | 539 | 554 | 569 | 584 | 599 | 614 | 629 |
| 525 | 540 | 555 | 570 | 585 | 600 | 615 | 630 |
| 526 | 541 | 556 | 571 | 586 | 601 | 616 | 631 |
| 527 | 542 | 557 | 572 | 587 | 602 | 617 | 632 |
| 528 | 543 | 558 | 573 | 588 | 603 | 618 | 633 |
| 529 | 544 | 559 | 574 | 589 | 604 | 619 | 634 |
| 530 | 545 | 560 | 575 | 590 | 605 | 620 | 635 |
| 531 | 546 | 561 | 576 | 591 | 606 | 621 | 636 |
| 532 | 547 | 562 | 577 | 592 | 607 | 622 | 637 |
| 533 | 548 | 563 | 578 | 593 | 608 | 623 | 638 |
| 534 | 549 | 564 | 579 | 594 | 609 | 624 | 639 |
| 535 | 550 | 565 | 580 | 595 | 610 | 625 | 640 |
| 641 | 656 | 671 | 686 | 701 | 716 | 731 | 746 |
| 642 | 657 | 672 | 687 | 702 | 717 | 732 | 747 |
| 643 | 658 | 673 | 688 | 703 | 718 | 733 | 748 |
| 644 | 659 | 674 | 689 | 704 | 719 | 734 | 749 |
| 645 | 660 | 675 | 690 | 705 | 720 | 735 | 750 |
| 646 | 661 | 676 | 691 | 706 | 721 | 736 | 751 |
| 647 | 662 | 677 | 692 | 707 | 722 | 737 | 752 |
| 648 | 663 | 678 | 693 | 708 | 723 | 738 | 753 |
| 649 | 664 | 679 | 694 | 709 | 724 | 739 | 754 |
| 650 | 665 | 680 | 695 | 710 | 725 | 740 | 755 |
| 651 | 666 | 681 | 696 | 711 | 726 | 741 | 756 |
| 652 | 667 | 682 | 697 | 712 | 727 | 742 | 757 |
| 653 | 668 | 683 | 698 | 713 | 728 | 743 | 758 |
| 654 | 669 | 684 | 699 | 714 | 729 | 744 | 759 |
| 655 | 670 | 685 | 700 | 715 | 730 | 745 | 760 |
| 761 | 776 | 791 | 806 | 821 | 836 | 851 | 866 |
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| 763 | 778 | 793 | 808 | 823 | 838 | 853 | 868 |
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| 765 | 780 | 795 | 810 | 825 | 840 | 855 | 870 |
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| 767 | 782 | 797 | 812 | 827 | 842 | 857 | 872 |
| 768 | 783 | 798 | 813 | 828 | 843 | 858 | 873 |
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| 774 | 789 | 804 | 819 | 834 | 849 | 864 | 879 |
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| 645 | 660 | 675 | 690 | 705 | 720 | 735 | 750 |
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| 762 | 777 | 792 | 807 | 822 | 837 | 852 | 867 |
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*Reader's Service Dept.*

*You said it, Princess Wenatchee! This race looks like the KENTUCKY "500" with Chief Keokuk left at the starting line, making like the Last of the Mohicans, while Junior's backers are getting ready with their best hurrahs. They know a sure winner!*

In the race for lower costs and higher quality, many foundries and steel plants have spotted the standout favorite—Keokuk Silvery Pig Iron—the superior form of silicon introduction. Pig for pig . . . car for car, this winner's uniformity never varies! Handle by magnet, charge by weight or count the pigs for equal accuracy. Aluminum producers, Keokuk Silicon Metal is a sure winner.

*KEOKUK ELECTRO-METALS COMPANY*
*Keokuk, Iowa*
Wenatchee Division, Wenatchee, Washington

*When you think of SILICON, think of KEOKUK!*

**KEOKUK SILVERY PIG IRON**

SILICON METAL - OTHER FERROALLOYS

Keokuk Silvery Pig—the superior form of silicon introduction for foundries and steel plants—is available in 60 and 30 lb. pigs and 12½ lb. piglets in standard analysis or alloyed to your specifications. Silicon metal and ferrosilicon are supplied in standard sizes and analyses.

**SALES AGENT: MILLER AND COMPANY**
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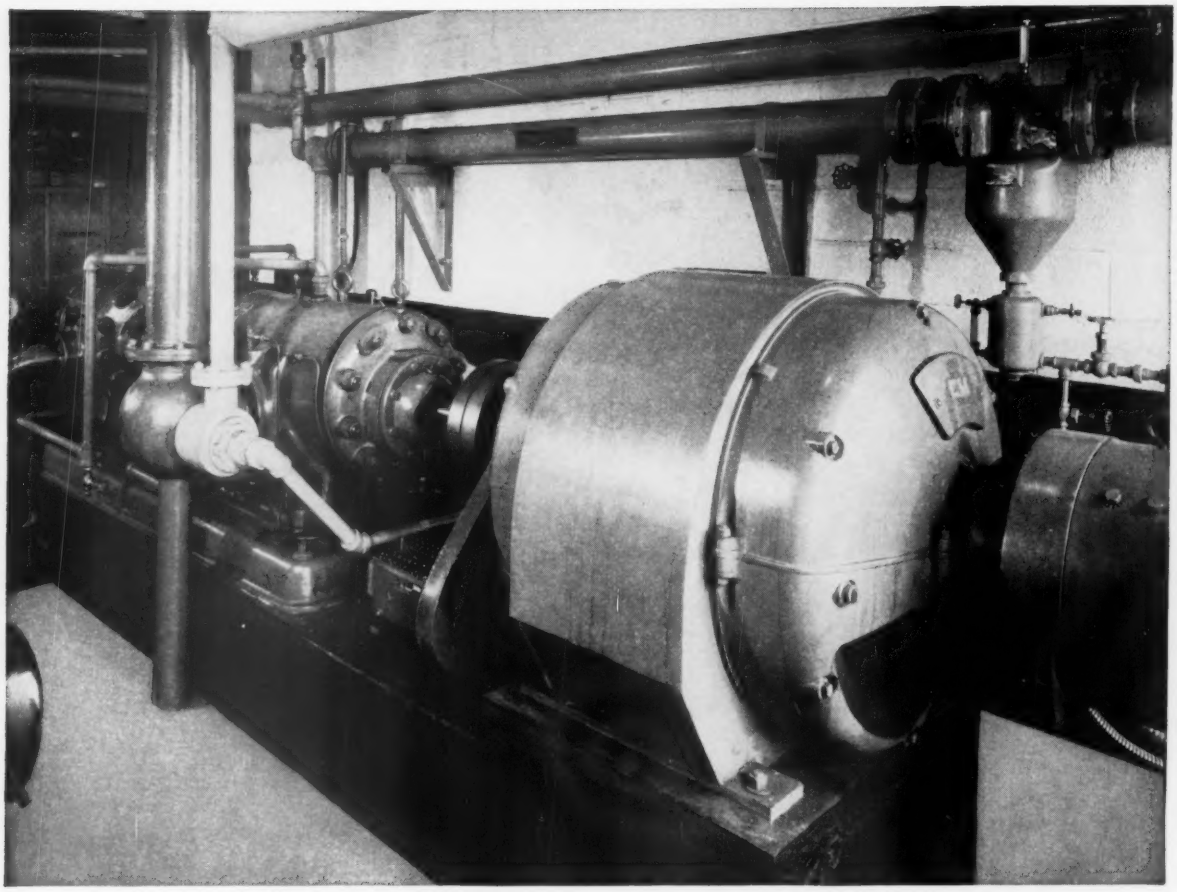


# THEY'VE ORDERED FULLER ROTARIES AGAIN AND AGAIN . . .

The proof is the record. Reading Tube Corporation bought its first Fuller Two-Stage Rotary Compressor in 1944—a C50-50H. To meet expanding pneumatic power requirements for increased production, they added a C100-100H Rotary in 1946. Again, the only and obvious choice was Fuller. In 1953, Reading Tube installed its third Fuller Rotary—a C175-175H, and reports continued satisfactory and economical operation, with a bare minimum of maintenance on all three.

Reading Tube Corp. uses Fuller compressors exclusively for such variety of needs as supplying air power in their casting shop, mill, draw benches, in testing and packing, as well as for hand accessories such as grinding, polishing, drilling, etc.

Check these advantages when your plant needs reliable air power . . . . they've made Fuller the choice, time and time again.

- . . . full capacity for life of the machine
- . . . smooth air flow
- . . . sustained performance for top capacities up to 3300 c.f.m. and pressures to 125 pounds
- . . . compactness and ease of installation, requires minimum space and light foundation
- . . . vibrationless due to absence of reciprocating parts.

To get all the facts, write today for Bulletin C-5A.

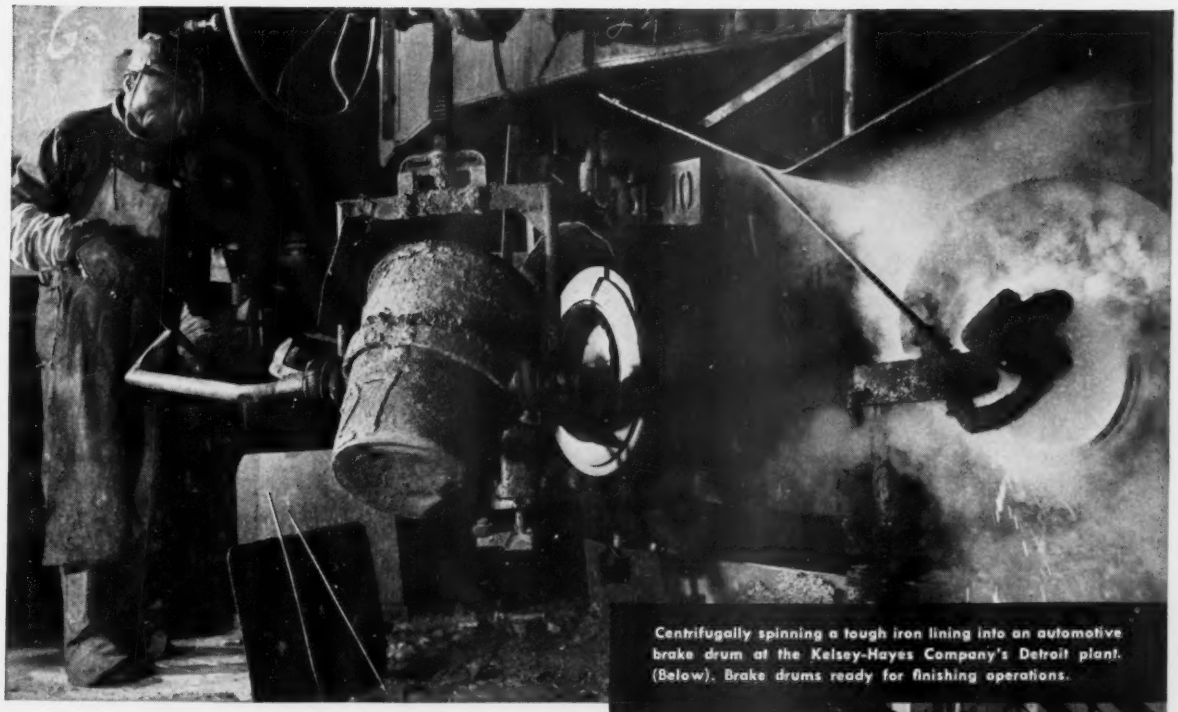
C-310
3894

FULLER COMPANY
GENERAL AMERICA
TRADE MARK

**FULLER COMPANY**
**148 Bridge St., Catasauqua, Pa.**
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Birmingham · Chicago · Kansas City · Los Angeles · San Francisco · Seattle

**Fuller**

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930



Centrifugally spinning a tough iron lining into an automotive brake drum at the Kelsey-Hayes Company's Detroit plant. (Below). Brake drums ready for finishing operations.

# Kelsey-Hayes casts longer wearing brake drums with Hanna pig iron

Kelsey-Hayes is a key supplier to the auto industry. One of its leading products is a brake drum with a centrifugally spun iron lining. Kelsey-Hayes also produces thousands of sand cast brake drums. Strict uniformity of each melt is of major importance to Kelsey-Hayes.

To maintain their high standards, Kelsey-Hayes uses thousands of tons of Hanna Malleable Pig Iron annually.

Kelsey-Hayes, like the many other Hanna customers, knows that for pig iron of high metallurgical quality and analysis, it can always depend on Hanna.

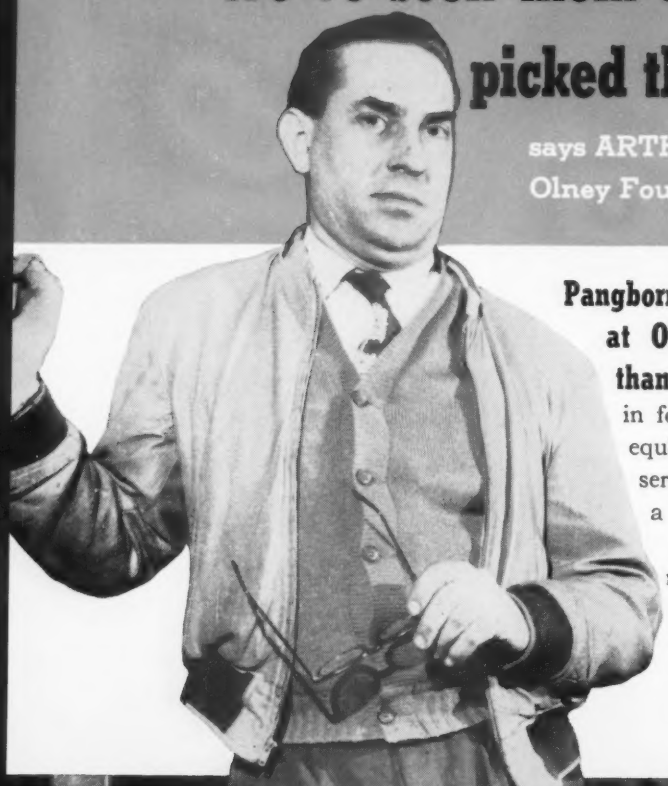
Hanna makes all regular grades of pig iron, as well as HannaTite and Hanna Silvery, available in two sizes—the 38-pound pig and the 10-pound HannaTen ingot. Hanna qualities contribute to the production of denser, stronger castings with uniform machining qualities. These features are particularly beneficial in HannaTite—a specially made iron, possessing extra-fine grain structure with smaller, uniformly distributed graphite flakes.

HANNA
THE FIRST KNOWN NAME IN IRON

THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION

# "We've seen them all... and picked the Pangborn Blastmaster®"

says ARTHUR LAKE, Plant Engineer,
Olney Foundry Div., Link-Belt Co., Philadelphia

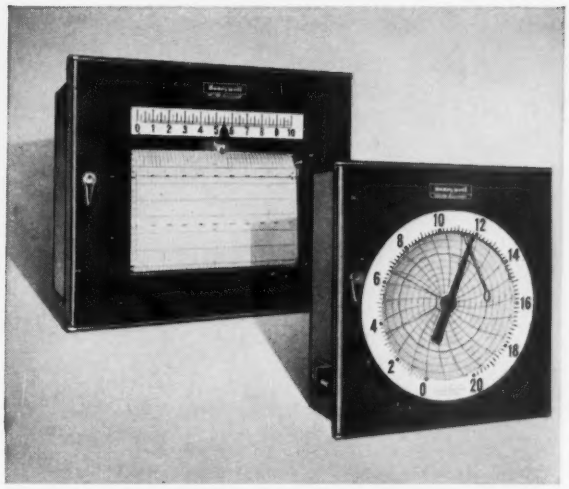


**Pangborn machine cuts labor and maintenance costs at Olney, CLEANS 25% FASTER and BETTER than previous equipment.** "We've had a lot of experience in foundry work," says Mr. Lake, "and we know foundry equipment. That's why we're sold on Pangborn construction, service and performance. Our Pangborn Blastmaster does a terrific cleaning job, does it *fast* and saves us money!"

If *you* need blast cleaning equipment, look at all makes. Then check the Pangborn Blastmaster. You'll find it offers many exclusive features plus a choice of sizes to fit your needs—1½, 3, 6, 12, 18 and 27 cu. ft. Write for Bulletin 703 to PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

# Pangborn blast cleans cheaper

Circle 600 on Inquiry Card—Page 51

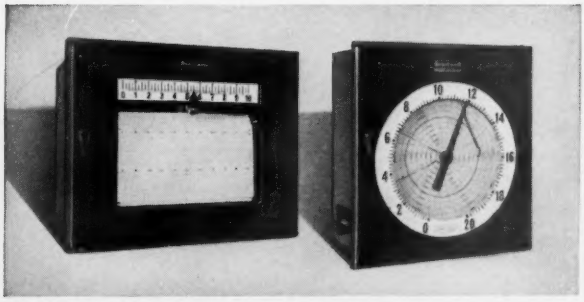


**Precision Class 15 Line** of *ElectroniK* instruments. Calibrated accuracy, ± .25% of span. Complete selection of many types of indicating and recording models, including electric and pneumatic controllers of most advanced type, and multi-point monitoring or recording of 2 to 400 points.

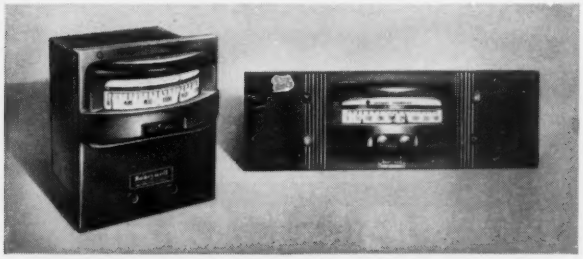
*for accuracy, versatility, price*

# . . . Let your application decide which Honeywell instrument

*fits your needs*



**Special Class 14 Line** of *ElectroniK* instruments. Calibrated accuracy, ± .5% of span. Priced lower than the Precision line. Strip chart and circular chart instruments, circular scale indicating controllers. With various types of electric control.



**Millivoltmeter Instruments.** Dependable, accurate service at low cost. Plug-in unit design speeds servicing. *Pyr-O-Vane* controllers, in either horizontal or vertical case, offer snap-action or time-proportioning electric control.

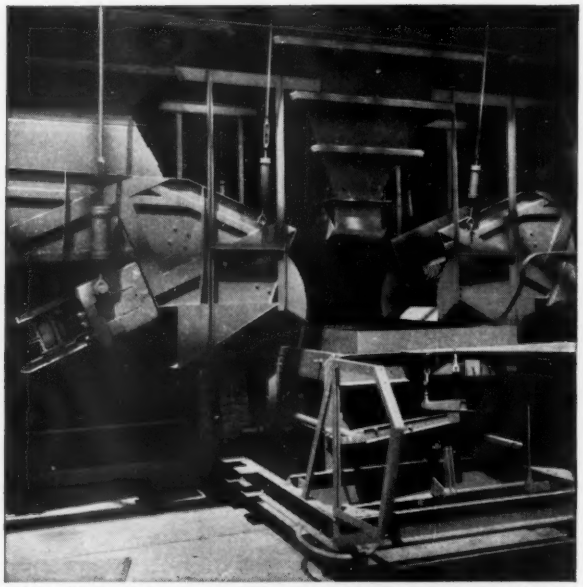
No need to "shop around" for instrumentation to fit your temperature measurement or control problem. From the Honeywell line—the most complete and diversified in the industry—you can be sure of getting exactly what your application requires.

Your local Honeywell engineer will be glad to consult on your requirements. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

MINNEAPOLIS
**Honeywell**
BROWN INSTRUMENTS
*First in Controls*

# JEFFREY puts VIBRATION to work in the foundry



**Feeding**—The flow of such materials as sand, coke, limestone, iron borings and castings is positively controlled by JEFFREY vibrating feeders. Rate of feed can be changed while a unit is running, and the response is instantaneous. No mechanical adjustments are required and power consumption is low. Units shown are vibrating feeders with grizzly sections, delivering coke and limestone from bin storage to a weigh car.

**Conveying**—JEFFREY mechanical vibrating conveyors are widely used for handling foundry sand and castings. Their gentle, but positive, conveying action does not tumble or degrade even fragile castings. Units are compact, sturdy and dustproof, with no wearing parts in contact with conveyed materials.

**Cooling**—Castings move slowly along this JEFFREY mechanical vibrating conveyor, which serves as a cooling means. Similar conveyors within the foundry carry small poured molds to the shakeout.

**For a free copy of Catalog 845** describing foundry equipment, write to The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

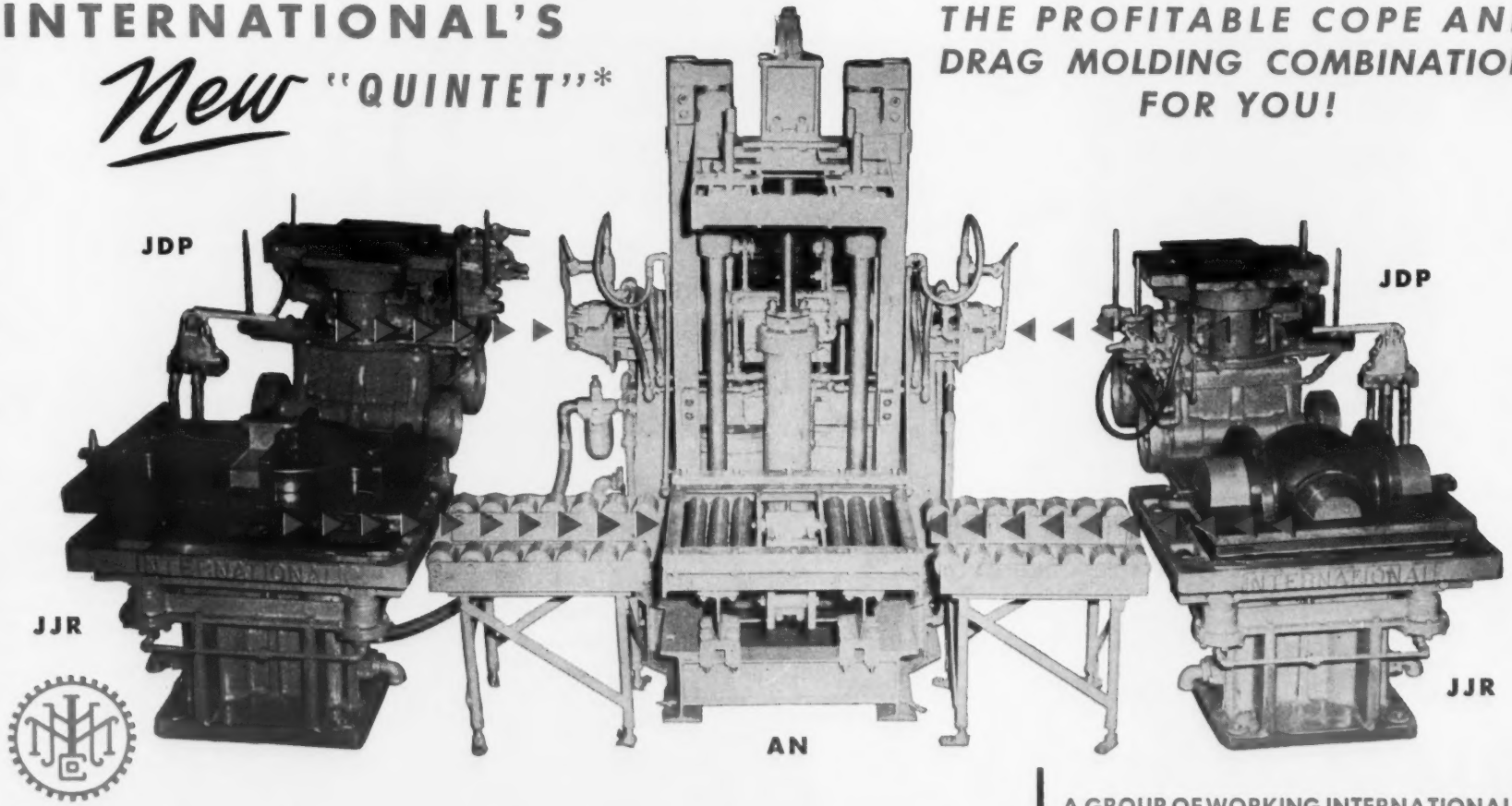


*Circle 602 on Inquiry Card—Page 51*

*Circle 603 on Inquiry Card→*

# INTERNATIONAL'S *New* "QUINTET"*

## THE PROFITABLE COPE AND DRAG MOLDING COMBINATION FOR YOU!




### JJR—DOUBLE JOLT MACHINE

Has double jolt feature and is sturdily built to give positive ram throughout core or mold. Jolt capacities range from 750 lbs. to 12,000 lbs.

### JDP—COPE MACHINE

Adaptable to large range of work suitable to pin lift style and readily adjustable. Exclusive feature is its positive jolt and true ram accomplished by use of double jolt section combined in one integral part. Will handle loads from 750 lbs. to 3000 lbs.

### AN—TURNOVER and DRAWING MACHINE

For clamping and turning over core boxes or flasks and for drawing the core or mold. Easily handles hard-to-draw, short runs and many different sized jobs. No rigging time is required. Capacity—750 lbs. to 10,000 lbs.

### A GROUP OF WORKING INTERNATIONALS

These individual machines are in combination to give you a complete cope and drag molding setup for both short and long production runs.

Investigate International's New Working Quintet Today! Just write us a note telling your cope and drag sizes, and our engineers will plan the best combination for your particular needs. NO OBLIGATION!

***International's System, illustrated by the "Quintet" shows just one of the many possible combinations.**

# INTERNATIONAL MOLDING MACHINE CO.
## LA GRANGE PARK, ILLINOIS

# LET'S LOOK at

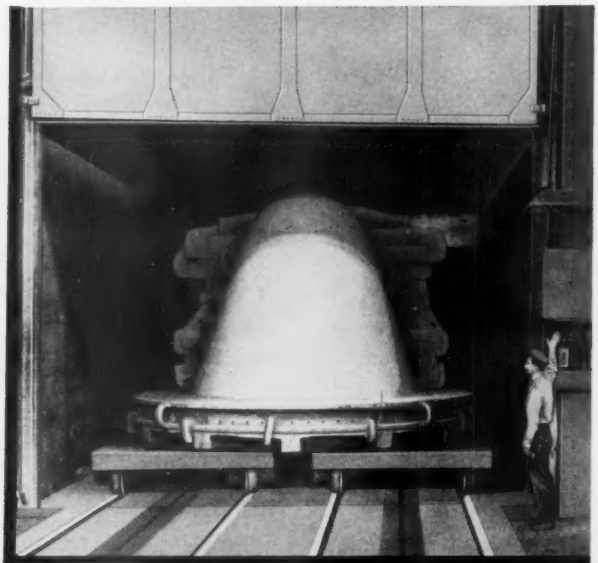
**OVENS** for every baking requirement

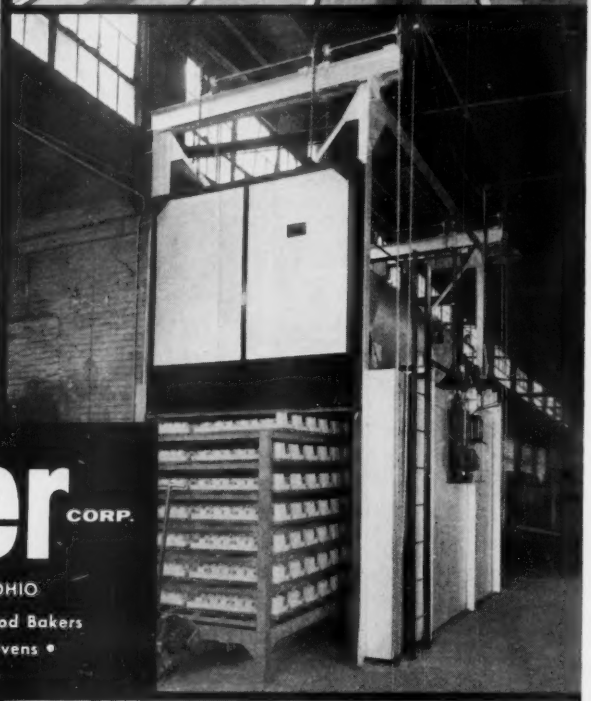
**OVENS** that will be faster and less expensive to operate

**OVENS** that are designed to best fit your operation

Carl Mayer designs and manufactures all types of ovens as well as "specials" to meet unusual operating conditions. Most incorporate the Carl Mayer recirculating heating system with sealed combustion chamber that keeps gases from prematurely escaping into the load area. Cores and molds are baked evenly with no burning. Temperatures are always under control.

***Write for Bulletin 53-CM***





*TOP RIGHT—This large car type mold oven is installed at Pittsburgh Steel Foundry. Its special triple slotted panel construction reduces heat loss 1/3. Fuel savings up to 50% over old conventional methods are possible. Drying time is often cut in half and temperatures are uniformly controlled.*

*MIDDLE RIGHT—This rack type core baking oven is at the Fremont Foundry Co., Fremont, Ohio. It is equipped with a recirculating combination gas-oil fired heating system.*

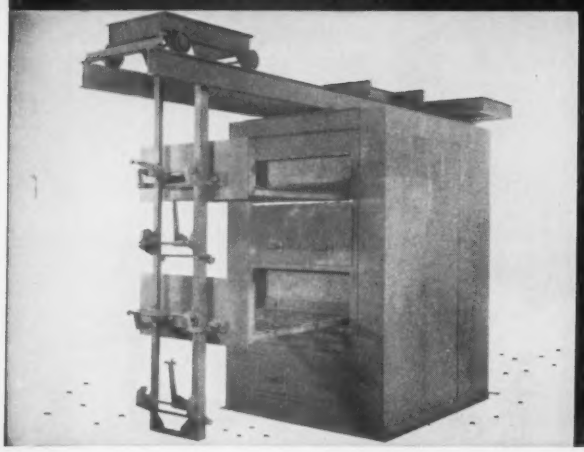
*BOTTOM RIGHT—Vertical Core Oven (unloading position) at A. C. Williams Company, Ravenna, Ohio. This oven is 11'-0" wide x 11'-0" deep x 45'-0" high.*

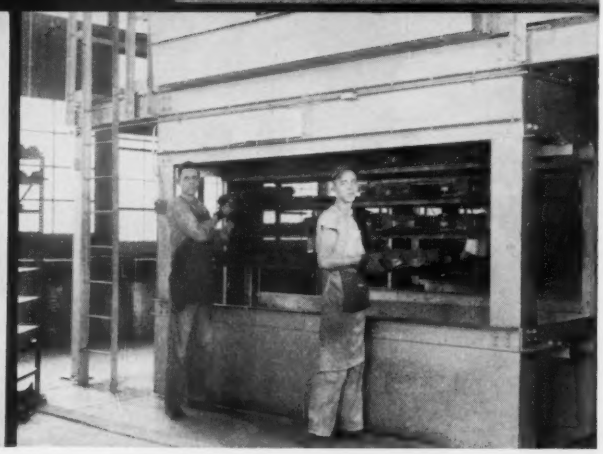
*BELOW—Our standard rolling drawer type core baking oven. The heating equipment (not shown) may be mounted on floor beside unit or on the roof. Particularly adaptable to brass and aluminum foundries.*

THE **carl mayer** CORP.

3030 EUCLID AVENUE CLEVELAND 15, OHIO

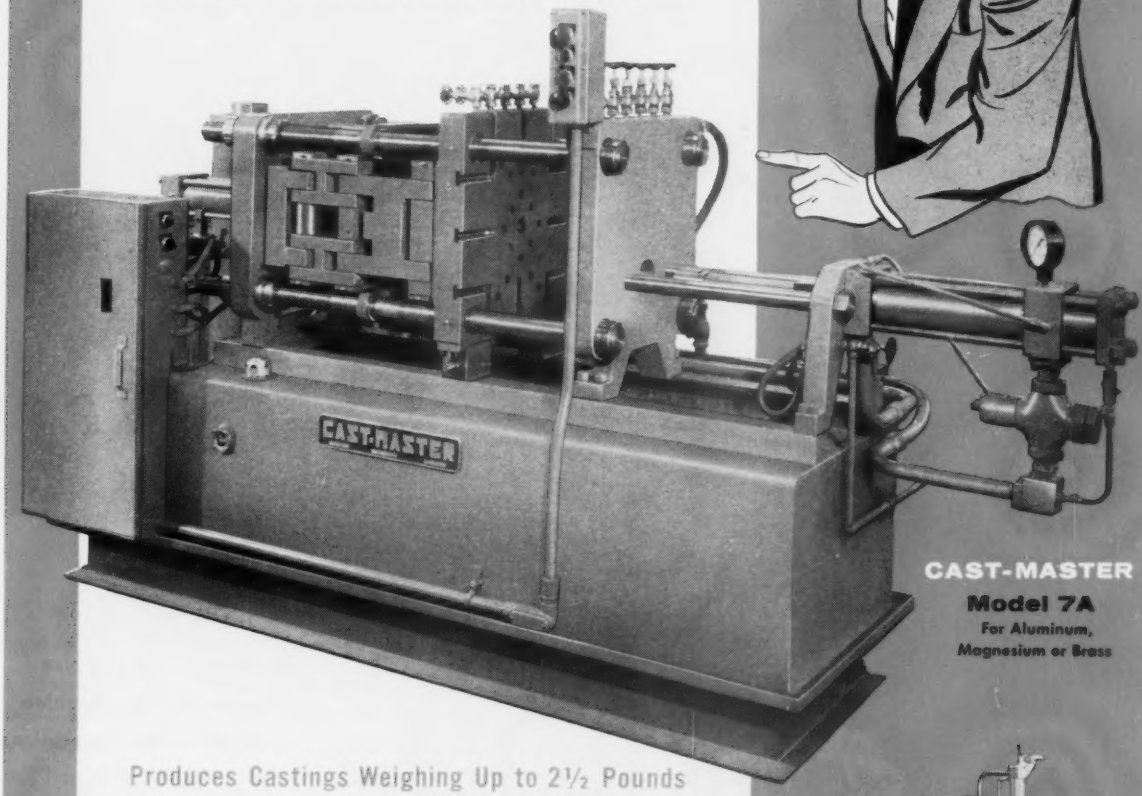
OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories





# DELIVERY FROM STOCK

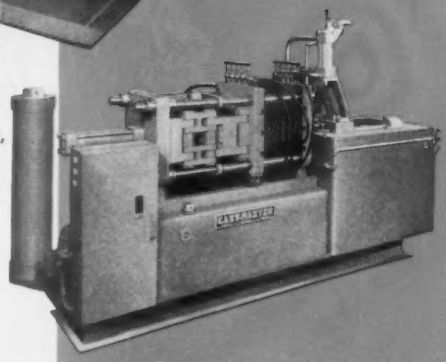
**Available in Both ZINC and ALUMINUM Models**




**CAST-MASTER**
**Model 7A**
For Aluminum, Magnesium or Brass

## Produces Castings Weighing Up to 2½ Pounds

Great news for producers of small castings! Now you can get *quick, direct-from-stock delivery* on two new Cast-Master Die Casting Machines: Model 7Z for Zinc, Tin, Lead — Model 7A for Aluminum, Magnesium, Brass. Both feature the same outstanding design and rugged construction of the larger models now operating in America's leading plants. That means solid steel platens, extra heavy linkage with multiple shear points, and many other details that make possible safer, high-speed production of mirror-smooth, hardware-finish castings.



**CAST-MASTER**
**Model 7Z**
For Zinc, Tin and Lead

**Send For Brochure Giving Full Details And Specifications**

*Eastern Representative:*
*Milton Harman, 18 Rock Rd., Milford, Connecticut*
*Midwest Representative:*
*C. W. Stone Co., Minneapolis 3, Minnesota*

**CAST-MASTER Inc.**
**23901 AURORA ROAD**
**BEDFORD, OHIO**

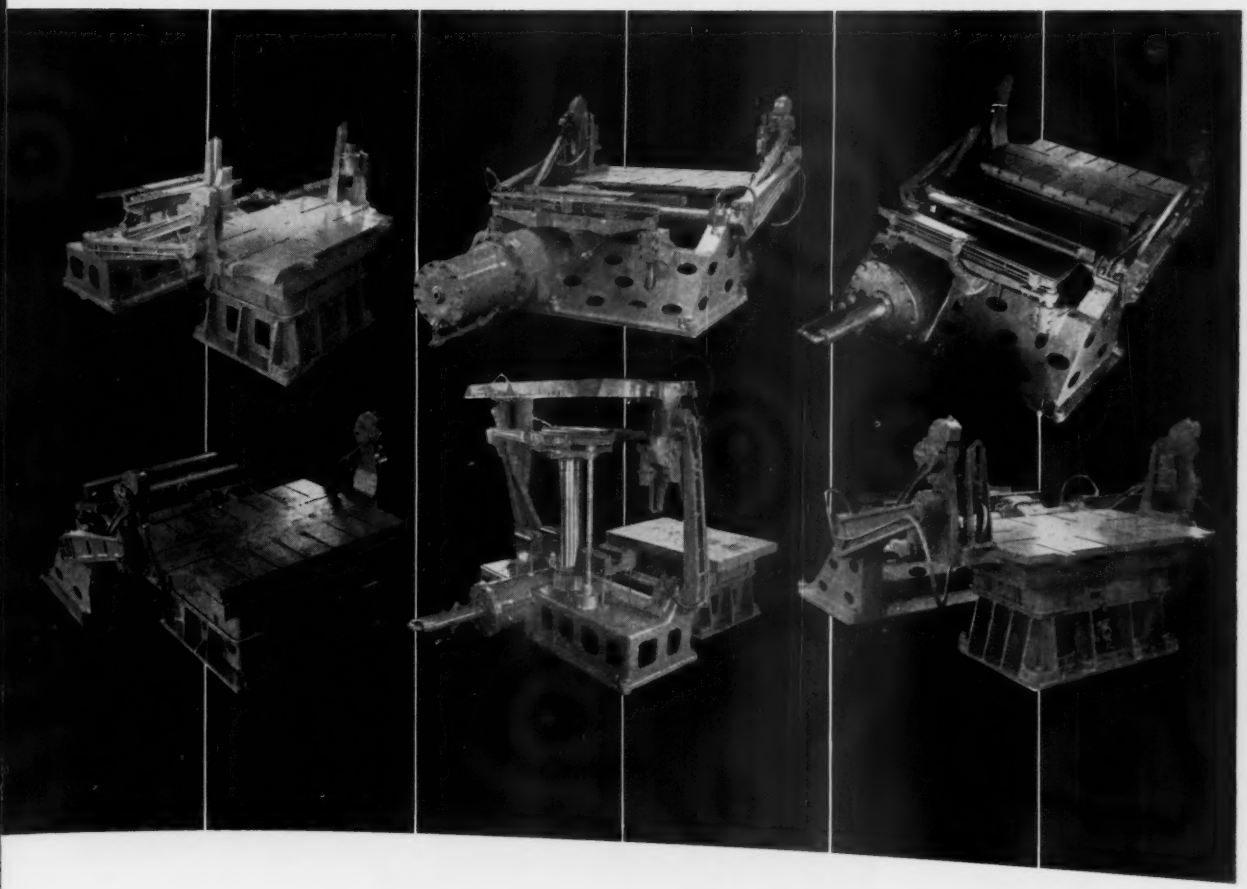
*Fifth of a series . . . heavy-duty jolt rollover machine*

# why foundrymen buy a HERMAN molding machine

*There is a type and size Herman Molding Machine to fit all foundry operations.*

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.



We know many things go into the selection of the right foundry equipment . . .

How well is it designed and constructed? How will it stand up under punishing demands? What about maintenance cost . . . downtime . . . production capacity? How will it improve our production picture? How fast can it be written off?

Experienced foundrymen know the Heavy-duty Herman Jolt Rollover Machine, like all Herman units, rates high on all these points. This heavy-duty unit operates with minimum downtime and low maintenance, which adds up to fast amortization.

Here are just a few of the advantages of this unit:

1. It's available in a rollover capacity range of 3,000 to 40,000 pounds.
2. A single valve controls all operations.
3. An air-on-oil principle eliminates all jerkiness, permits the machine to bleed to a stop smoothly and easily.
4. Extremely long pattern draw design.
5. No additional power is necessary for rollback operation.

Let us tell you how this Herman Heavy-duty Jolt Rollover Machine will fit <u>your</u> foundry requirements.

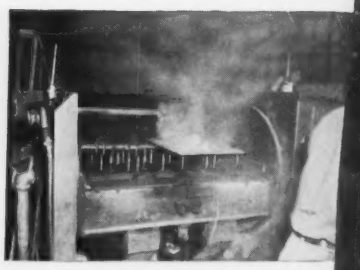
# HERMAN

**Best Known Name in Molding Machines**

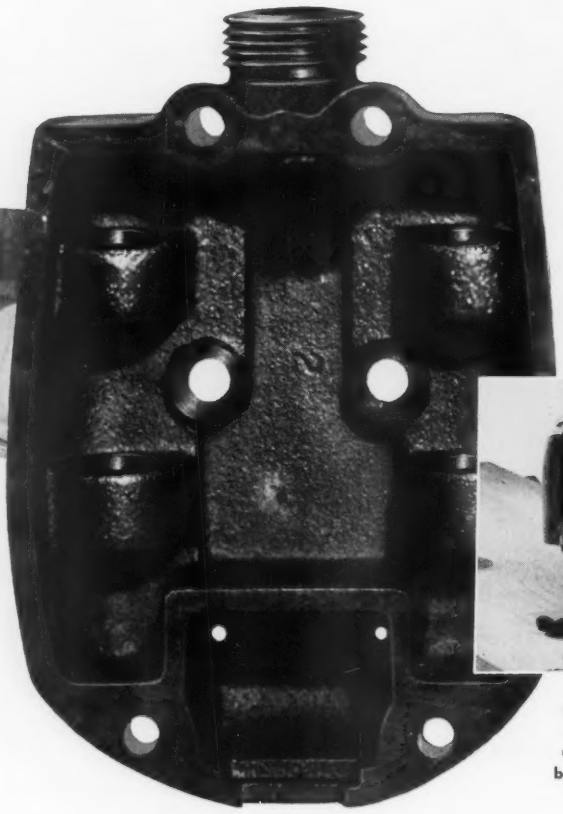


*Circle 601 on Inquiry Card—Page 51*

# finer castings from shell molds



Shell molds for front housing casting of SKIL Model 511 Jig Saw in production at Woodruff & Edwards, Inc., Elgin, Ill.



Front housing of SKIL Jig Saw is a grey iron casting having more uniform grain structure and better balance as a result of shell molding.

## ...foundry and customer benefit from **DUREZ RESINS**

**IT'S A LOT EASIER** to obtain the closer dimensional accuracy and minimized machining and polishing you expect with shell molding, when the molds really meet your specs.

Experience with Durez phenolic resins bears this out, according to Mr. Wayne Wright, Shell Division Manager at Woodruff & Edwards, Inc., a jobbing foundry at Elgin, Ill.

With seven shell machines in operation, Mr. Wright is getting molds of more uniform grain structure and density with Durez. Uniformity is obtained over a wider range of pattern temperatures and in sections with deep draws. On high projection patterns there is no peel-back or fall off. Molds build up faster during investment, so the production cycle is shorter, too.

Shells and cores bonded with Durez resins have superior hot and cold strength, permitting the most economical sand-to-resin ratios. Whether your mold-making operations are based on dumping or blowing, find out now how these resins can improve them. A trial shipment is all you need for a starter.

• • •

*Shell mold production with resin coated sand is authoritatively discussed in our 16-page booklet covering simplified procedure, coating methods, solvents, test methods, etc. Ask us for the "Durez Guide to Resin Coated Sand".*

DUREZ®

Phenolic Resins that Fit the Job

**DUREZ PLASTICS DIVISION**

HOOKER ELECTROCHEMICAL COMPANY

1006 WALCK ROAD, NORTH TONAWANDA, N. Y.

HOOKER CHEMICALS PLASTICS



Circle 607 on Inquiry Card—Page 51

*To replace muscle with machinery on a moderate budget,*
*Michigan Model 12B Tractor Shovel*

# Boosts Foundry Production 16%

*for Wisconsin Foundry & Machine Company, Madison, Wisconsin*

This thriving, 20-man foundry pours gray iron and semi-steel castings—averaging five tons per 9½-hour day—mainly for machine tools. But until recently all hard, heavy hauling had to be done by hand. Then company management saw a Michigan Tractor Shovel, decided to give it a try. Result? The Model 12B Michigan—working just part time—does the work of three barrowmen. The company saves $50 per day in wages, puts 30 man-hours per day into productive work. Here's how:

### Removes Sand and Burnt Cores

Refuse, averaging four tons per day, used to take *eight man-hours* per day to collect, transport and load into trucks. All used sand, burnt cores, other waste can now be handled in as little as *15 minutes* by the Michigan!

### Transfers New Sand in Narrow Alley

Molding sand used to be dumped outdoors, in all weather, brought into foundry by hand. Now trucks dump directly into the 16 cu ft Michigan bucket for movement to storage bins. The Model 12B transfers seven tons in only *half an hour,* despite maneuvering a narrow alley every trip!

### Hauls Big Castings —Anywhere!

The Michigan Tractor Shovel picks up big castings—like 3,000-lb "skull-crackers"—and transports them 1½ blocks from foundry to yard. *One* machine and *one* operator cut time and equipment needed for this "problem job".

### Hoists Heavy or Bulky Light Items

Eight workers used to manhandle 1,000-lb flasks up stairs for storage; *one man* in the Michigan now hoists them 7 feet to the second floor. Light-but-bulky wood patterns go by the bucketful from upstairs pattern shop to foundry—quickly, gently, as needed.

### Odd Jobs Prove Michigan's Versatility

Foundry floor hadn't been levelled for years, the Michigan cut through the hard-packed waste to do the job in a couple of Saturday afternoons. It also has hauled plexo-brick and other supplies from trucks and nearby suppliers' warehouses —traveling at street speeds—even has transferred hard-to-handle coke from boxcars to storage bins.

### See 12B In Action —In Your Own Plant

If you, too, have some material-handling jobs you're doing by hand—or some jobs you're doing with outdated loaders—a new, bigger, heavier, power-shift Michigan can save you money. For proof, ask your Michigan Distributor to arrange a Model 12B demonstration right in your plant; let him help you pick the size bucket best suited to your needs: 6 to 27 cubic feet.

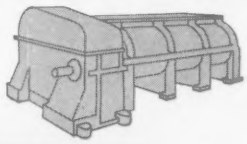
Michigan is a registered trade-mark of

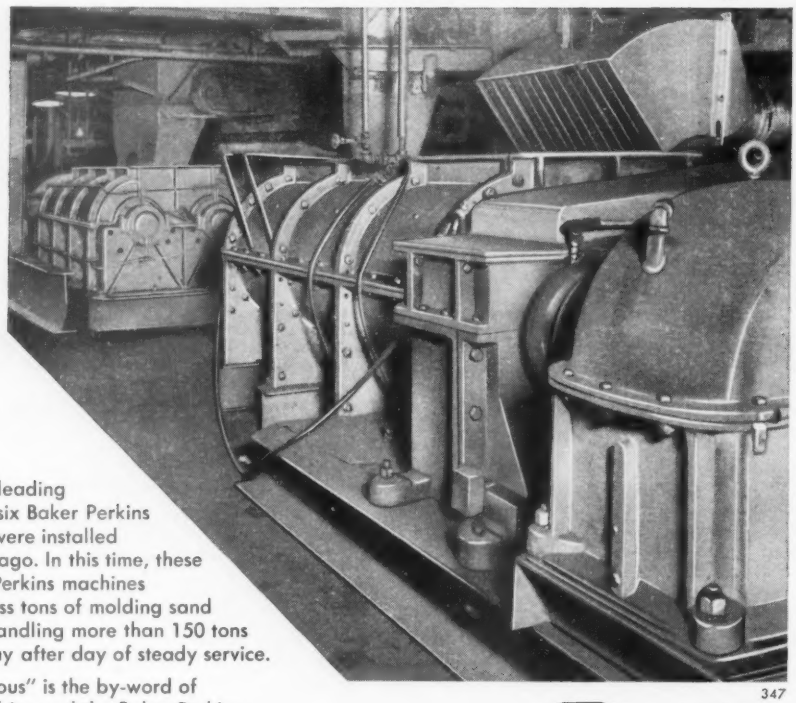
**CLARK EQUIPMENT COMPANY**
**Construction Machinery Division**
**2475 Pipestone Road**
**Benton Harbor 21, Michigan**
**In Canada: Canadian Clark, Ltd., St. Thomas, Ontario**

**CLARK® EQUIPMENT**

# SIX BAKER PERKINS CONTINUOUS MULLERS

## process up to 900 tons of sand per hour in foundry of leading auto manufacturer





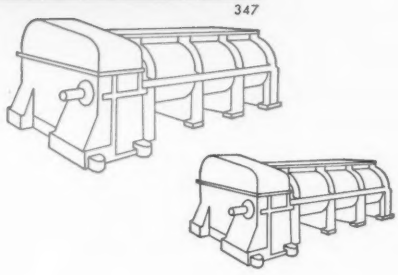
347

In the foundry of a leading auto manufacturer, six Baker Perkins Continuous Mullers were installed more than 10 years ago. In this time, these dependable Baker Perkins machines have mulled countless tons of molding sand . . . each machine handling more than 150 tons per hour through day after day of steady service.

Operation "Continuous" is the by-word of all production foundries and the Baker Perkins Continuous Sand Muller is designed specifically for sand conditioning on a TRULY CONTINUOUS basis. Sigma type agitators, rotating at differential speeds and producing a figure 8 motion give the required compression as well as aeration and cooling effect.

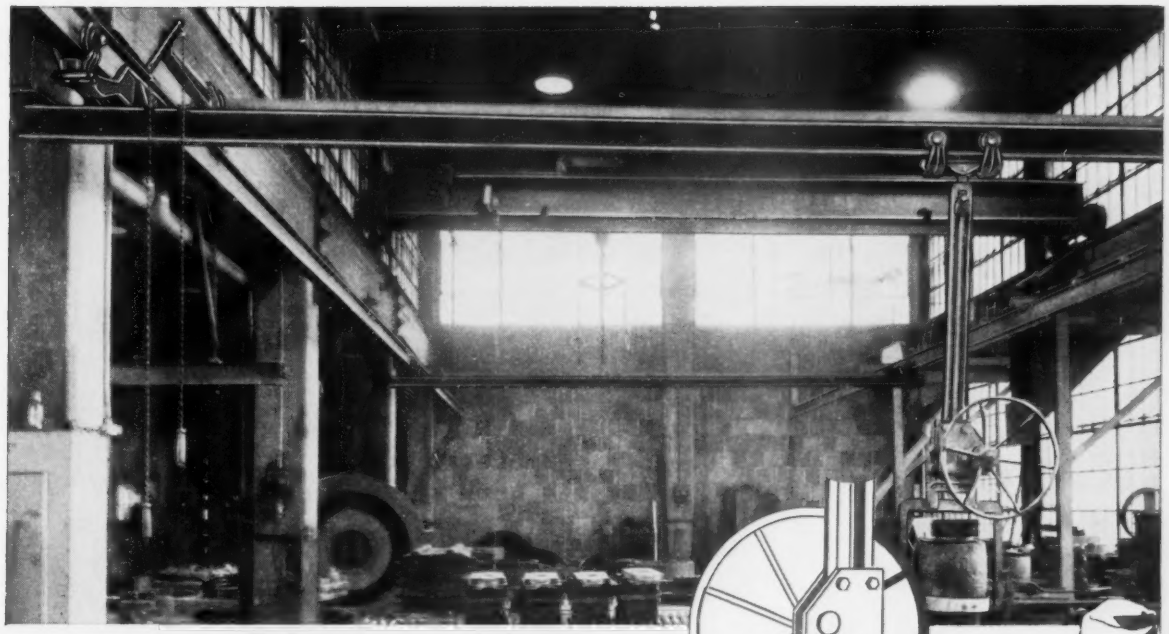
Baker Perkins Continuous Mullers are made in sizes capable of 30 to 300 tons per hour in a continuous, uninterrupted flow of perfectly mulled sand and require practically no maintenance other than the expected replacement of those quickly renewable sections, which are exposed directly to the abrasive action of the sand.

Write today for catalog no. F-156.



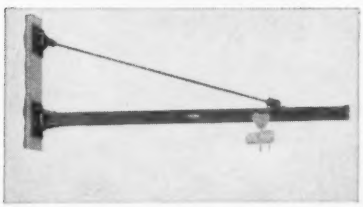
## BAKER PERKINS INC.

FOUNDRY MACHINERY DIVISION • SAGINAW, MICHIGAN

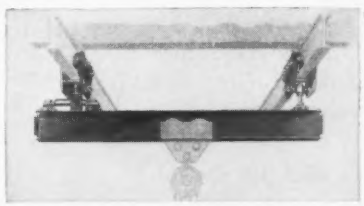


# Reduce handling costs with . . . R-W CRANE and "TRU-TRED" MONORAIL SYSTEMS

Modern foundries have found that they can now efficiently and safely cut costs, and speed-up production by installing R-W Cranes and Monorail Conveyor systems. Whether you need a single unit for a specific operation or a complete system, R-W Cranes and Monorail Conveyors combine ladle handling with maximum smoothness and safety, plus 100% utilization of pouring floor area. Transfer crane with safety interlocks at transfer points provide flexibility and easy handling throughout pouring operations. R-W Cranes and Monorail systems are available in a size to efficiently and economically meet your specific requirements.



R-W 939 Swinging Jib Crane . . . available in a wide variety of sizes and capacities up to 4000 lbs. . . . Furnished with rod support. R-W 968 Jib Crane has curved track to support the outer end of boom.



R-W 971 Flexible Traveling Crane . . . self adjusting yoke and cross head . . . will not bind as bridge need not maintain right angles to tracks. Available in variety of sizes and capacities up to 8000 lbs. Not applicable as a transfer crane.

Why not let an R-W Sales-Engineer show you, without cost or obligation, how R-W equipment can effect remarkable savings for you in time, money and maintenance. Write today for complete information.

**Richards-Wilcox**
**MANUFACTURING COMPANY**
"MATERIAL HANDLING DIVISION"

RICHARDS WILCOX R&W AURORA, ILL.

466 W. THIRD STREET, AURORA, ILLINOIS • Branches in Principal Cities

**ELPAR CRANE** places measured amounts of charge materials into dump bucket. Cranes are available in capacities from 2,000 to 10,000 pounds.

**ELPAR® TRUCKS**

# GIVE YOU MUCH MORE

**More Economy**—Although they are usually assigned the toughest jobs, ELPAR electric trucks operate with maintenance and operating costs up to 75% *less* than gas trucks.

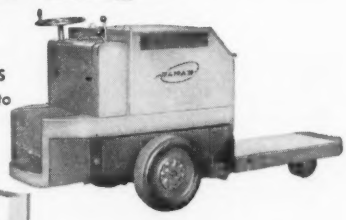
**More Service**—Over 90% of ELPAR trucks made since 1925 are still in productive use. Careful design and rugged construction throughout assure at least 15-20 years of dependable service.

**More Models**—You choose the right truck for the job from over 100 basic models in all types.

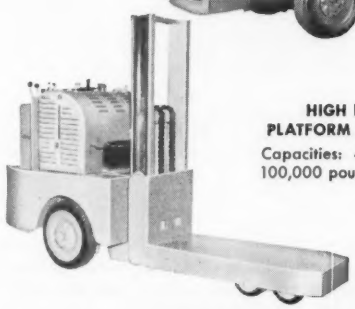
**More Assistance**—Elwell-Parker representatives provide expert help in truck selection . . . and expert advice in proper operating and preventive maintenance procedure.

**WANT MORE FACTS?** Write for General Catalog and Individual Truck Bulletins.

**FORK TRUCKS**
Sit-down and stand-up, center and end control models. Capacities: 2,000 to 10,000 pounds plus heavy-duty models from 20,000 to 80,000 pounds.



**LOW LIFT PLATFORM TRUCKS**
Capacities: 4,000 to 100,000 pounds



**HIGH LIFT PLATFORM TRUCKS**
Capacities: 4,000 to 100,000 pounds

**THE ELWELL-PARKER ELECTRIC COMPANY**
4314 St. Clair Avenue — Cleveland 3, Ohio



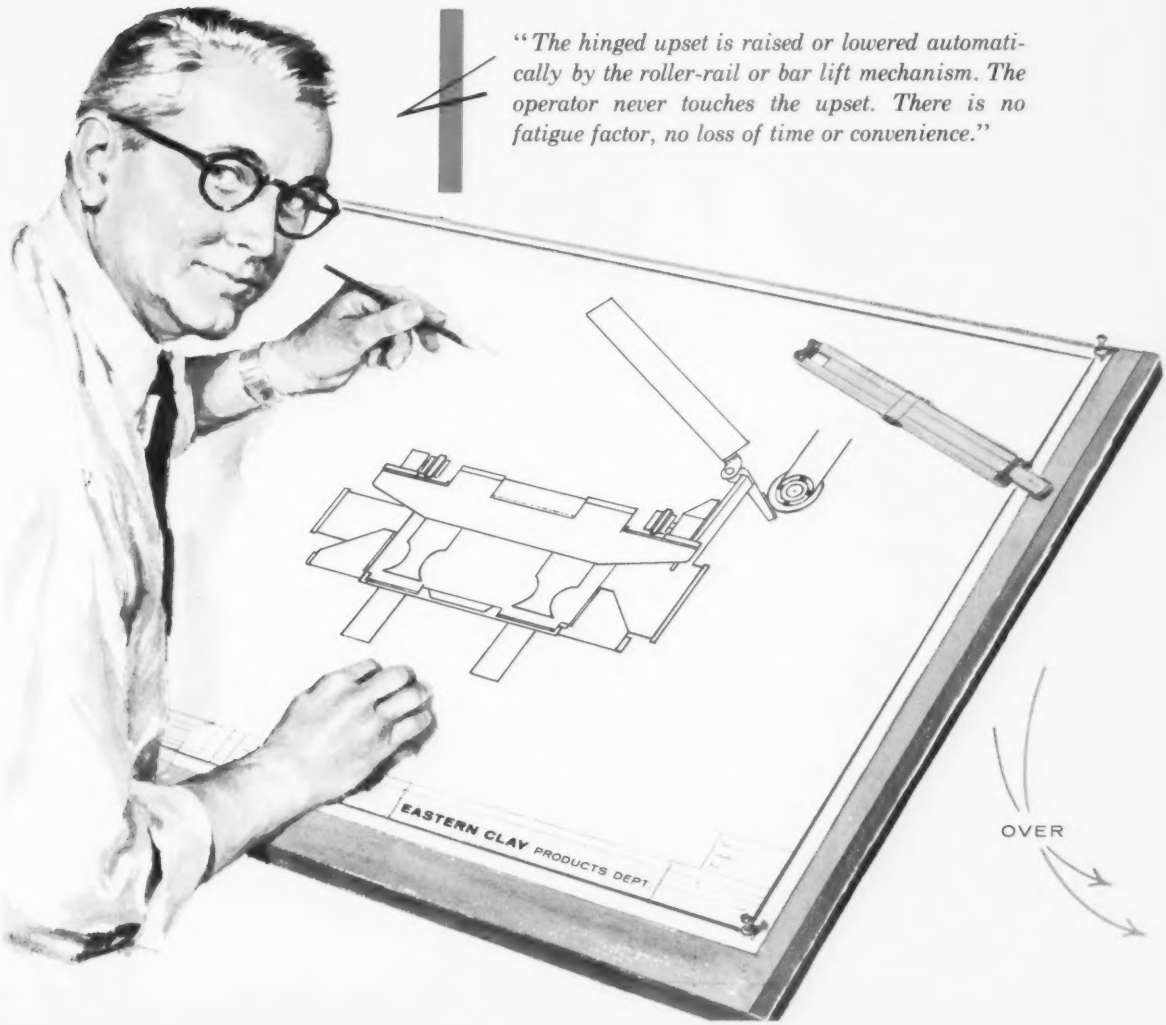
Circle 611 on Inquiry Card—Page 51

Circle 596 on Inquiry Card→

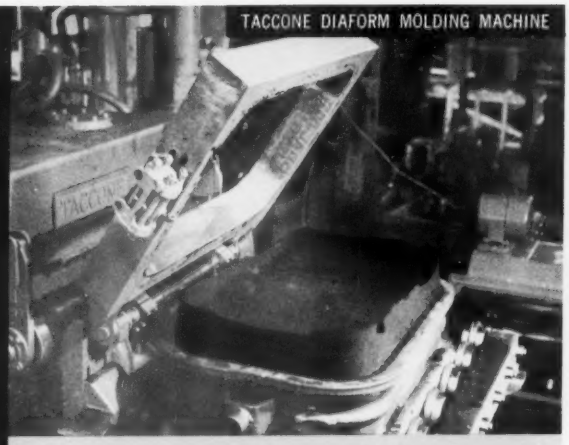
# How You Can Use
# High Pressure Diaform Squeeze
# with
# Light, Shallow and Regular Flasks

Now, by installing the new automatic power-driven upset strike-off, you can use existing flask equipment with the Taccone Diaform Molding Machine. This new auxiliary mechanism enables you to adopt high pressure diaform squeeze at minimum cost . . . and quickly get the economies, speed of operation and precision casting performance that are possible with the high pressure process.

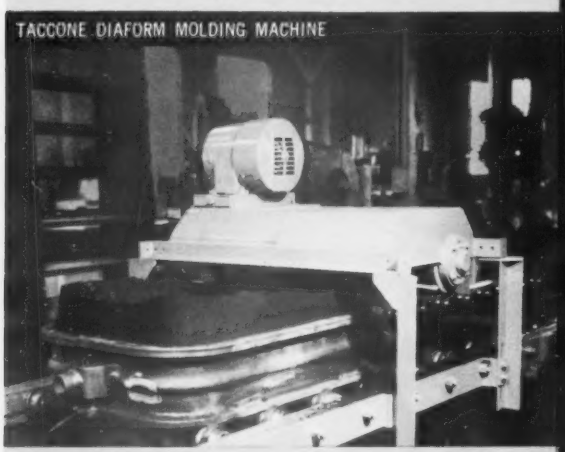
*"The hinged upset is raised or lowered automatically by the roller-rail or bar lift mechanism. The operator never touches the upset. There is no fatigue factor, no loss of time or convenience."*



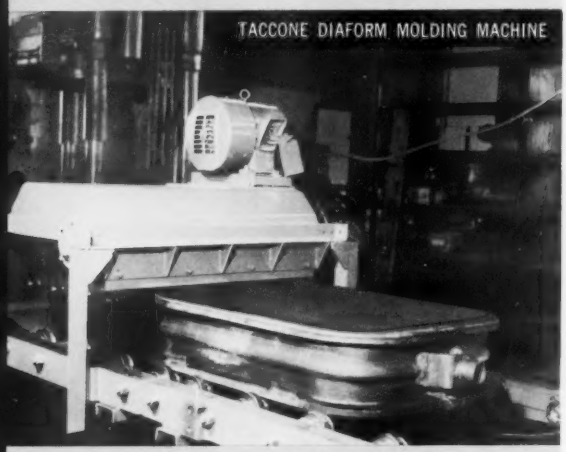
1 The power-driven hinged upset takes all the outward thrust exerted by the diaphragm. Therefore, even with the high pressures involved, flask distortion is always at a minimum even with light flask equipment.




2 The hinged upset lifts automatically to clear the mold for either manual or automatic strike-off. This operation takes place during the stripping cycle so there is no lost time or motion. The upset is drafted to insure a clean strip.




3 The power-driven strike-off can be mounted in any convenient position, either beside the molding machine or on the relief conveyor. The mold may be pushed through manually or by a simple pneumatic pusher or indexing device.

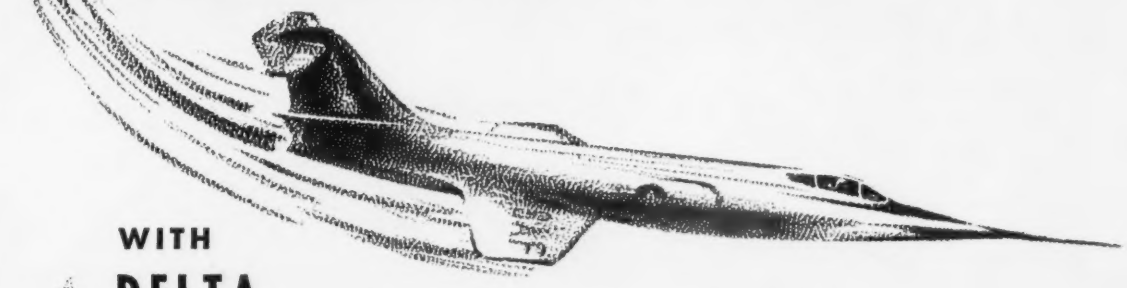



4 The strike-off gives you a flat mold for convenience in setting on conveyors or floor, or for setting weights. The flat cope and drag eliminates the need for increased flask depth and extra heavy construction.

We would welcome an opportunity to explain this new upset strike-off mechanism in greater detail. Simply write for your copy of the complete portfolio on High Pressure Molding. It will show you how, with the Taccone Diaform Molding Machine, you can get greater speed, improved finish of castings, reduced casting weight and lower maintenance . . . which all add up to greater profit.

**EASTERN CLAY** PRODUCTS DEPT.
**INTERNATIONAL MINERALS & CHEMICAL CORPORATION**
20 NORTH WACKER DRIVE, CHICAGO 6 • PHONE: FInancial 6-1800

# COVER GREATER SURFACE AREA ...AND GET SMOOTHER... CLEANER CASTINGS... *at lower cost!*



WITH

## DELTA SUPERKOAT WASH

### FOR ALL TYPES OF METALS

Delta SuperKoat Wash is recommended for Steel, Gray Iron, Malleable and Non-Ferrous castings. It's easy to mix and apply uniformly to green or dry sand and baked core surfaces by dipping, swabbing, spraying or brushing.

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

**NOTE THESE IMPORTANT ADVANTAGES OF DELTA SUPERKOAT WASH:**

1. **NO PRECIPITATION OR SETTLING —** When thoroughly mixed, wash will stay in suspension indefinitely.
2. **EASY TO APPLY —** It can be dipped, swabbed, brushed or sprayed on green or dry sand and baked surfaces.
3. **RAPID, DEEP PENETRATION & EXCELLENT ADHESION —** Quickly anchors itself 5 to 7 grains deep in sand surfaces.
4. **NON-REACTIVE — LOW GAS —** Will not react or produce gas in contact with molten metal.
5. **REDUCED CLEANING COSTS —** Cast surfaces are smoother and castings are cleaner.
6. **WILL NOT FLAKE —** When completely dried, the wash is thoroughly bonded to the sand surfaces.
7. **HIGHLY REFRACTORY —** Has an unusually high fusion point.
8. **ELIMINATES SAND FUSION AND BURN-ON —** Flowing metal will not crack or rupture wash during pouring.
9. **ECONOMICAL TO USE —** Covers a greater surface area at a lower cost per pound of wash.

DELTA

**DELTA OIL PRODUCTS CO.**

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

**MILWAUKEE 9, WISCONSIN**

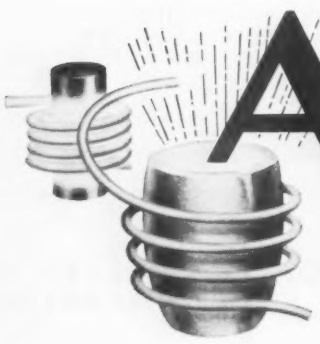
# AJAX-Northrup furnaces mean new business for Adirondack

Three new Ajax-Northrup furnaces are *more* than paying their way at Adirondack Foundries and Steel Company, Watervliet, New York. Less than six months after installation, they opened a new half million dollar a year market, with promise of even doubling *that*.

Adirondack could easily handle the largest jobs in arc furnace steel, but not the low carbon, high alloy types. That's why The Company turned to Ajax-Northrup induction furnaces . . . the one efficient method of accurately melting these metals. Three Ajax-Northrup high-frequency induction furnaces with capacities of 2,000 lbs., 1,000 lbs., and 300 lbs. powered by a single 350KW generator met the need exactly.

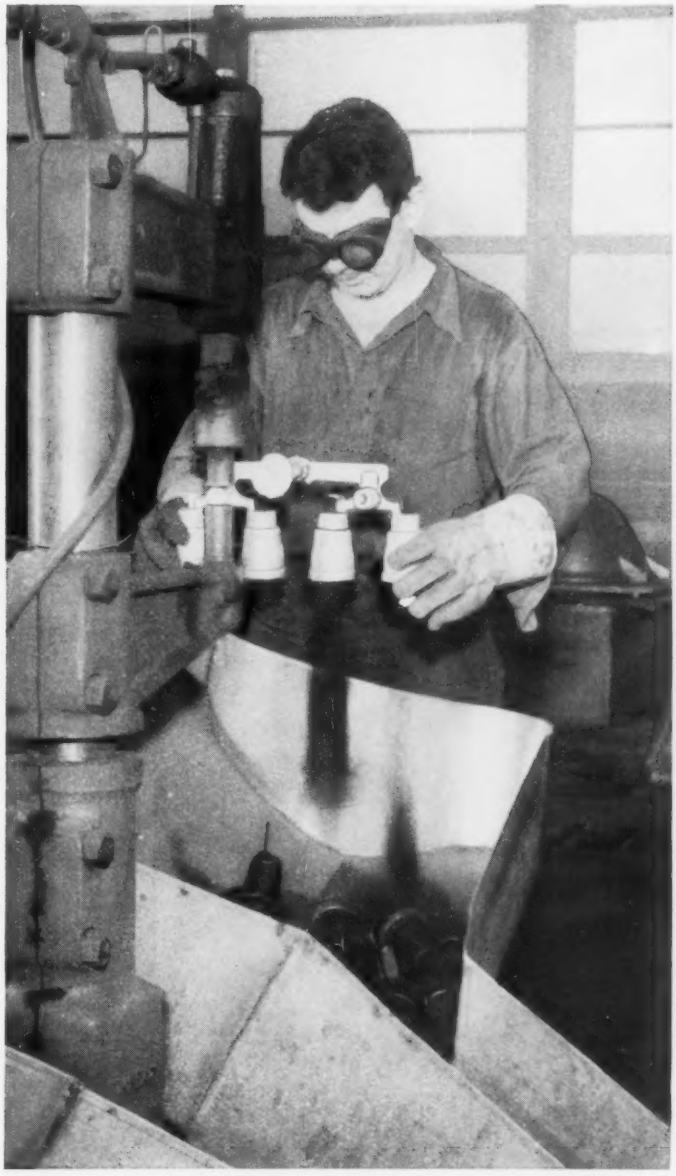
From the start, Adirondack enjoyed fast melting under close control, low alloy losses, and amazing economy . . . economy that permitted the foundry to take, profitably, more than half a million dollars new business. The advantages of Ajax-Northrup induction melting equipment can be realized in your foundry, too, whether ferrous, non-ferrous, or both. Write Ajax Electrothermic Corp., Trenton 5, New Jersey, for additional details in Bulletin 27-B.

*Associated Companies:* Ajax Electric Company — Ajax Engineering Corporation

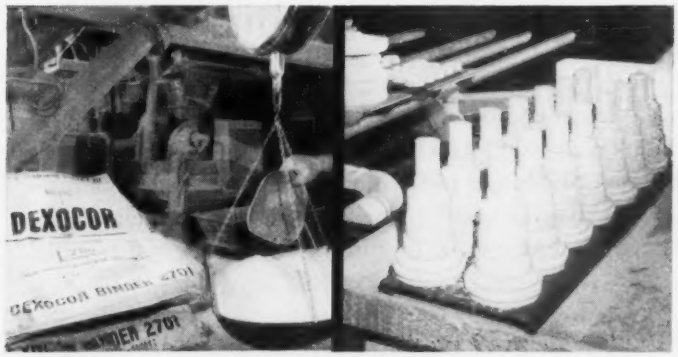


AJAX NORTHRUP *SINCE 1916*

## INDUCTION HEATING-MELTING



No back-up of castings at shake-out stations now! Excellent collapsibility of cores is one of the many advantages provided by Dexocor.




A soluble dry powder, Dexocor is easy to weigh and mix, assures high green strength, cores withstand necessary handling.

Finished cores made with Dexocor are baked in up to one-third less time, stand up against hot metal during pouring.

# "Truly phenomenal collapsibility" OF CORES CREDITED TO DEXOCOR® BINDER

**Leading non-ferrous foundry finds this revolutionary new binder brings about many other improvements—from mulling to shake-out.**

Plagued by back-up of castings at shake-out stations, this 5 tons-per-day aluminum foundry sought means of improving collapsibility of cores—and found it, in the amazing new *dry binder*, DEXOCOR.

But that was not all they discovered. Reports the superintendent:

"In addition to truly phenomenal collapsibility, DEXOCOR is easy to weigh and mix, provides excellent green strength, and both blown and rammed cores slide readily from boxes. With DEXOCOR, baking time is reduced 30 to 35%, cores stand up perfectly against hot metal—no cracking, no metal penetration, less gas and smoke—and we save 30% on cereal content of core sand mixes."

Used with Mogul or Kordek binder, DEXOCOR dry binder can improve the characteristics and performance of any core sand mix. For more information, and assistance in improving *your* operation, contact our nearest sales office, or write to:

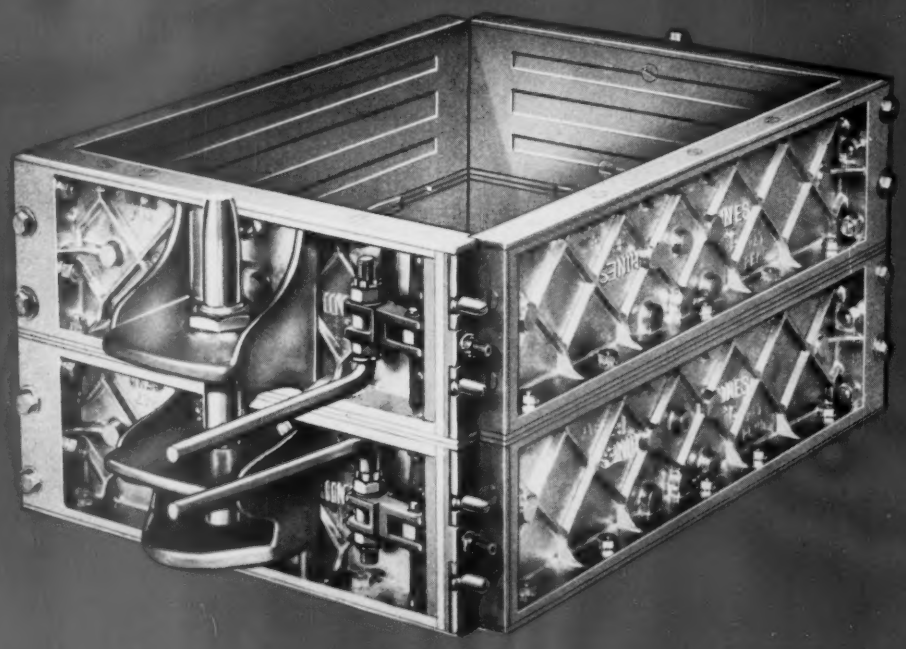
**CORN PRODUCTS SALES COMPANY**
17 Battery Place, New York 4, N. Y.

*Corn Products also makes* MOGUL® *and* KORDEK® *binders and* GLOBE® *dextrins for the Foundry Industry.*



Circle 614 on Inquiry Card—Page 51

# HINES *straight-wall*

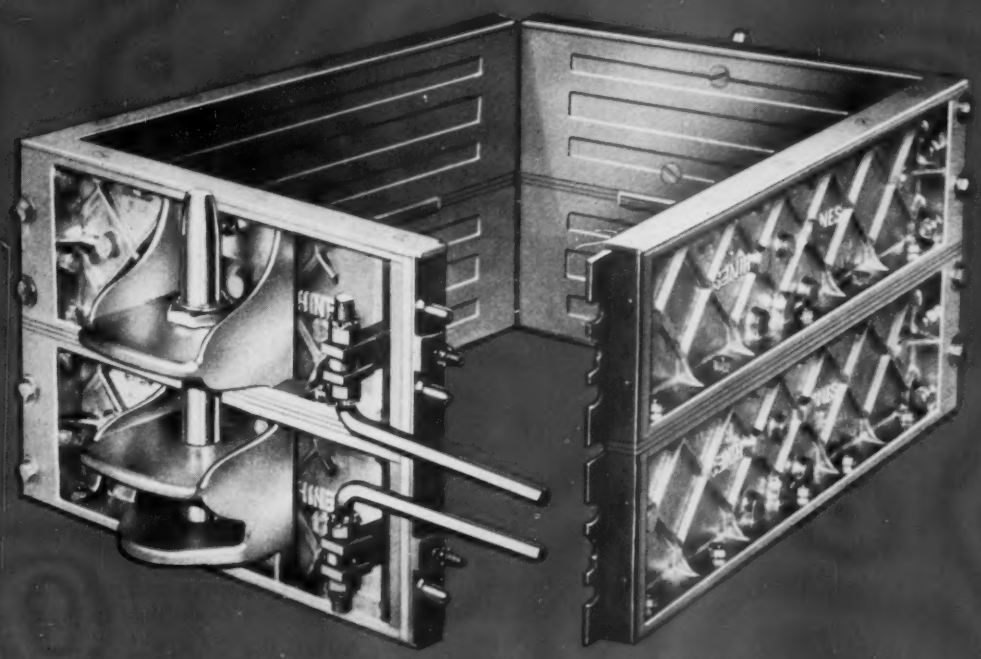


PATENTS PENDING

This new, straight-wall, Hines "HINGE-OFF" flask is recommended for hand and mechanical molding of loose, match plate and cope and drag plate patterns, up to 20″ in length. Made of light weight metal, it maintains alignment because it will not warp from absorbing moisture and drying, as in wood flasks. No wood screws to work loose! Accurate pins and guides and pin center alignment! And, it is provided with a positive, fast-acting, locking mechanism that aligns and locks the open end perfectly and rigidly, to prevent shift!

Maintenance is economical — flask can be repaired and kept in alignment at your own plant. Only one adjustment — tightening the nuts on the locking mechanism. Lengths and widths, 10″ to 20″, in even inches. Cope and drag depths, 3″ to 5½″, in half-inches. Depths over 5½″ are made up in sections. Equipped with Hines standard pins, bushings or guides.

# HINGE-OFF FLASK



PATENTS PENDING

This new "HINGE-OFF" flask is being used in our newly developed STACK OR MULTIPLE MOLDING METHOD (Patents Pending). Contact our Main Office for working arrangements and prices.

MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC.

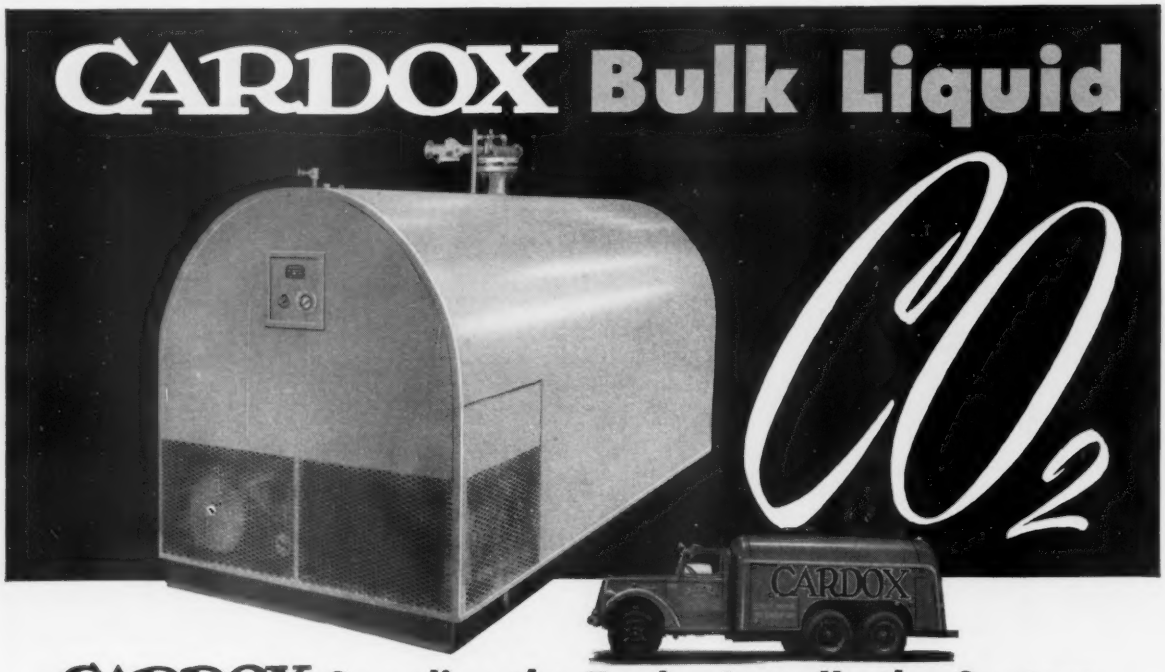
## THE HINES FLASK CO.

**3431 WEST 140th STREET • CLEVELAND 11, OHIO**



Circle 615 on Inquiry Card—Page 51

***You Don't Have to Invest a Penny***
**IN CAPITAL...RENT...or UPKEEP**
***to Get the Benefits and Savings of***




## CARDOX *Supplies the Tank—Installs the System —and Maintains it for You**

It's a fact! You can save money, improve and simplify your operations with CARDOX Bulk Liquid $CO_2$—and you don't have to pay *a penny in capital outlay, equipment rental or maintenance expense.* All you pay for is the CARDOX $CO_2$ you actually use—at the very reasonable rates established in your contract.

We install the CARDOX System of Bulk Liquid $CO_2$ Delivery and Storage. We handle and pay for all normal maintenance. CARDOX $CO_2$ is delivered by our own tank trucks *when you need it* and simply *pumped* by the ton into the CARDOX Storage Unit at your plant.

Hundreds of plants now using the CARDOX System would consider no other! They know from actual experience that it saves labor—reduces $CO_2$ consumption and losses—eliminates servicing interruptions—simplifies handling and cuts costs all along the line. And they like the prompt delivery they get from CARDOX' facilities in principal cities.

Find out how easy it is to switch over to CARDOX Bulk Liquid $CO_2$—the System that will modernize bottling plant operation. WRITE AT ONCE FOR FULL PARTICULARS.

***Based upon reasonable consumption requirements. CARDOX Storage Units may also be purchased, if you prefer.**

**CARDOX DRY ICE**

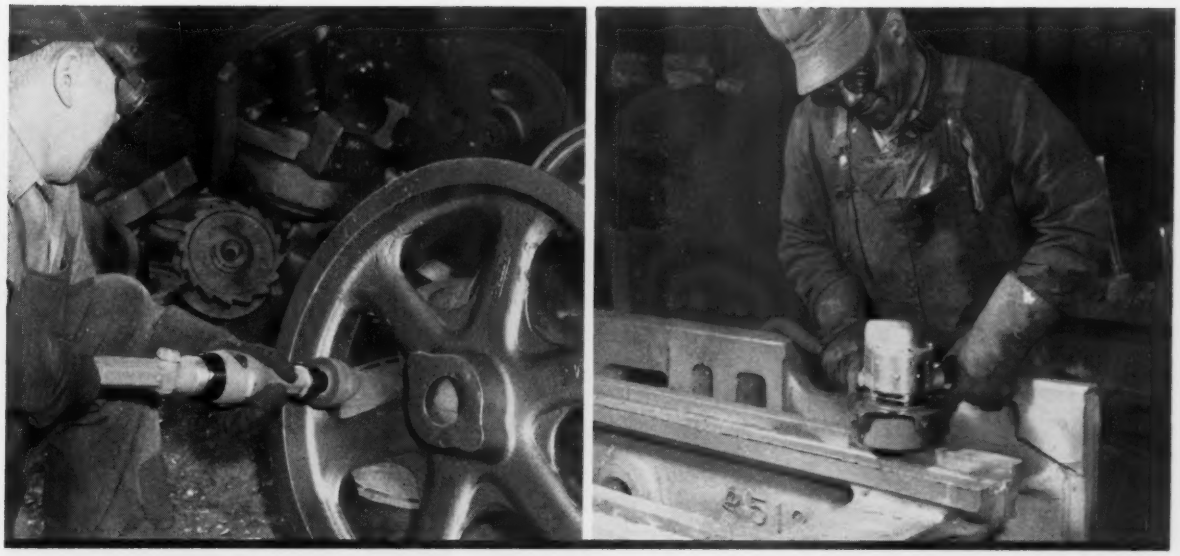
**is now available in most principal cities**

**DRY ICE DEPOTS AT:**

**Philadelphia • Jersey City • Detroit • Boston**
**Chicago • Milwaukee • Phoenix • Los Angeles**
**San Diego • Oakland • Fort Worth**

**CARDOX CORPORATION • 307 N. MICHIGAN AVE. • CHICAGO 1, ILLINOIS**

**Liquid $CO_2$ Supply Depots at: Norristown, Penna. Suffolk, Va. St. Louis, Mo. Barberton, Ohio Dearborn, Mich. Oakland, Calif. Los Angeles, Calif. San Diego, Calif. Phoenix, Ariz. Cabin Creek, W. Va.**



# Profit-boosters for your portables

*Snagging with the latest economy wheels —44 ALUNDUM* abrasive and B-11 resinoid bond— brings you many new "Touch of Gold" advantages*

44 ALUNDUM abrasive is non-premium priced . . . made differently, for extreme toughness and ruggedness . . . cuts faster, grinds cooler and lasts longer than other non-premium priced aluminum oxide wheels . . . thoroughly job-proved in foundries throughout the country.

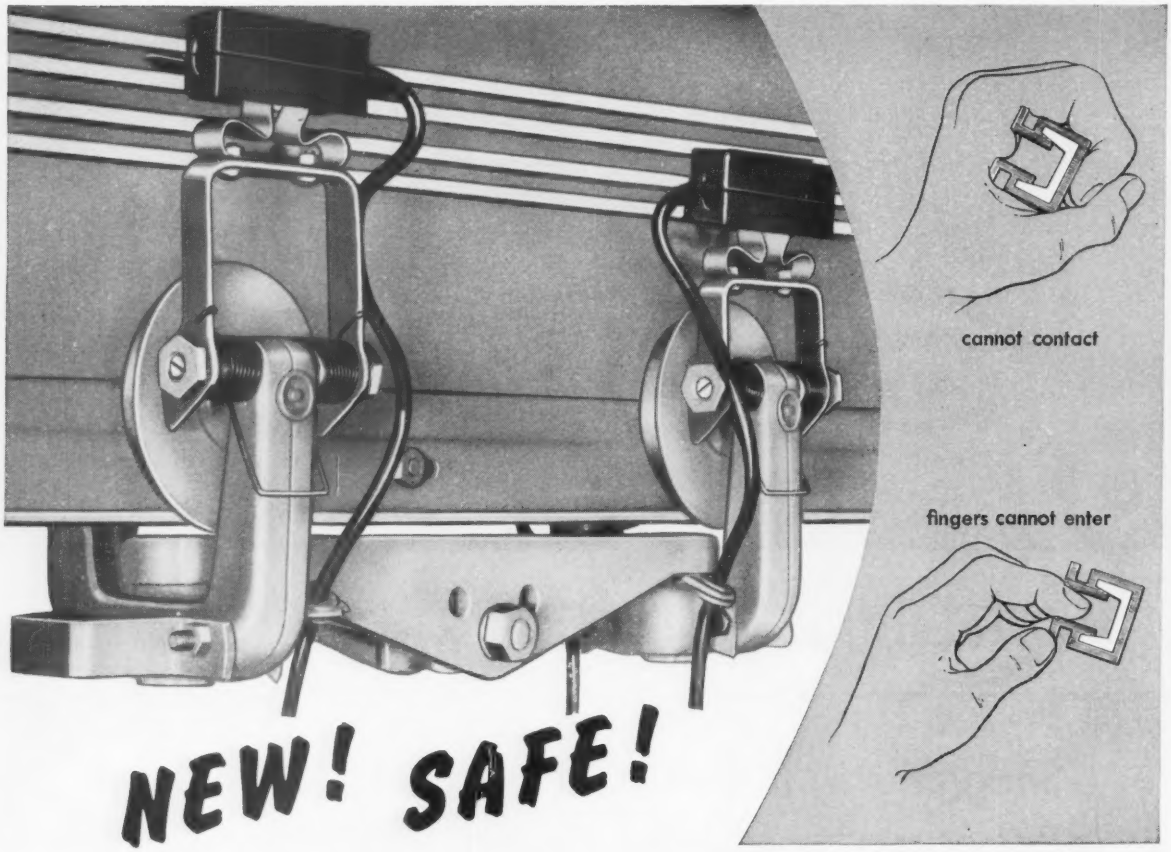
B-11 resinoid bonded wheels have more uniform structure and better balance . . . "hug that work" closer, with less vibration and bounce . . . are made to closest possible duplication, in half-grade increments evenly spaced across the entire hardness scale.

On your portable grinders, as on your other snagging machines, Norton-developed wheels of "44" plus "B-11" are abrasive and bond teams that will speed cleaning room operations, reduce operator fatigue and cut grinding costs. Your Norton Distributor will gladly arrange test runs in your plant. See him, or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries W-1793

NORTON
ABRASIVES
*Making better products... to make your products better*

**NORTON PRODUCTS:**
Abrasives • Grinding Wheels
Grinding Machines • Refractories
**BEHR-MANNING DIVISION:**
Coated Abrasives • Sharpening Stones
Behr-cat Tapes




# NEW! SAFE!

## AMERICAN MONORAIL

# KANT SHOCK

## SHIELDED ELECTRIFICATION

### For Monorail Track and Crane Systems

By covering its standard bus bar electrification with a specially designed polyvinyl chloride extrusion, American MonoRail now furnishes completely safe electrified systems.

This KANT-SHOCK shielding absolutely prevents accidental contact with live bus bars. It is impossible for an adult's finger to enter the shield.

A new type sliding shoe collector provides a floating contact throughout a monorail system regardless of any misalignment due to bent bars or at switch and inter-lock connections.

KANT-SHOCK Electrification positively eliminates all the hazards of open bar conductors — prevents costly accidents — protects employees—reduces insurance rates.

Write for KANT-SHOCK Bulletin KS-1

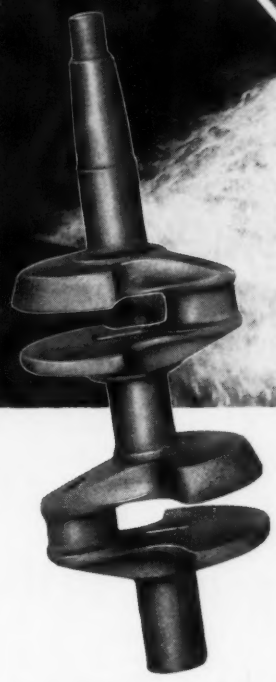
Member of Materials Handling Institute and Monorail Manufacturers Association

For Power Driven Conveyors, Use Landahl Chainless Conveyors

AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE, CLEVELAND 7, OHIO (IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

*Smoother Cruising* **with *EVINRUDE'S* new quiet-power motor**



**Horsepower UP—weight DOWN!** Shell molded crankshaft for 35 H.P. Big-Twin Evinrude outboard motor. Crankshaft is produced by using sand coated with Plenco #371

*Smoother Production* **with rugged new improved crankshaft**

# shell molded with Plenco resins

Formerly a steel forging, Evinrude crankshafts are now a steel casting made by the shell molding process. Savings have proved to be two-fold: (1) The larger castings are delivered to the machine shop for less than the former purchase price of the forgings; (2) several machining operations have been eliminated entirely. An additional benefit has been a saving of up to 35% in weight; the forged crankshaft weighed 12 pounds, while the one shell molded with the help of Plenco resins weighs only 8 pounds.

The cast crankshafts have resulted in quality equal or better than the former forgings. Too, a long lead time is no longer necessary as the shell molding operation can be closely coordinated with machine shop requirements. Life of the shell pattern is obviously much greater than a forging die.

Naturally, many resins were evaluated by Evinrude for an operation of this magnitude. We are pleased that Plenco 371 was selected. Shell molding is one of the manufacturing methods utilized by long-experienced Evinrude of Milwaukee to increase horsepower 40% in the last several years. Shouldn't you check the advantages of shell molding?

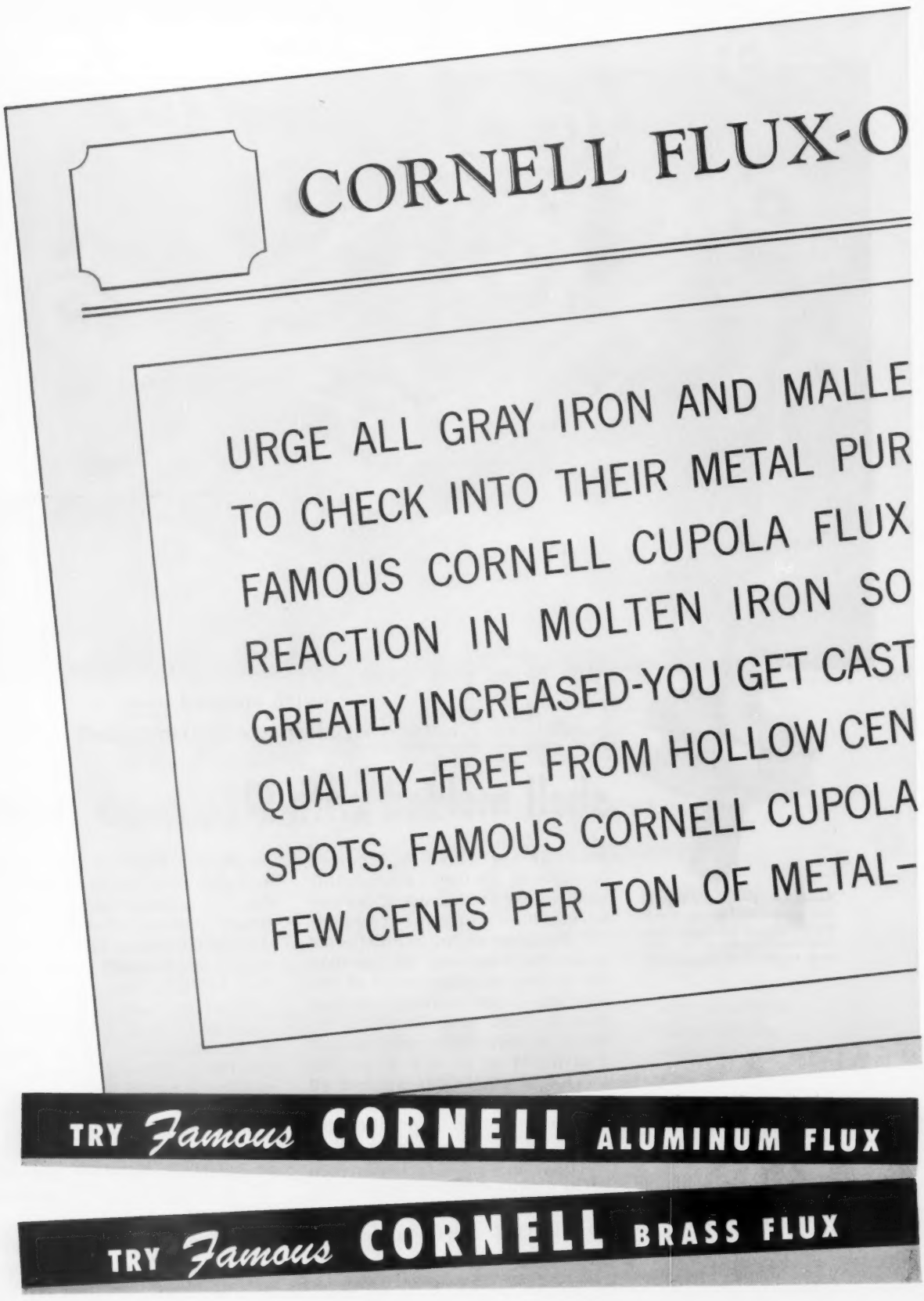
PLENCO PHENOLICS
FOR BETTER PLASTIC PRODUCTS

**PLASTICS ENGINEERING COMPANY** Sheboygan, Wisconsin

Serving the plastics industry in the manufacture of high grade phenolic molding compounds, industrial resins and coating resins.



Circle 619 on Inquiry Card—Page 51

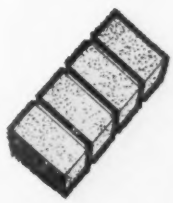

CORNELL FLUX-O
URGE ALL GRAY IRON AND MALLE
TO CHECK INTO THEIR METAL PUR
FAMOUS CORNELL CUPOLA FLUX
REACTION IN MOLTEN IRON SO
GREATLY INCREASED-YOU GET CAST
QUALITY–FREE FROM HOLLOW CEN
SPOTS. FAMOUS CORNELL CUPOLA
FEW CENTS PER TON OF METAL–
TRY Famous CORNELL ALUMINUM FLUX
TRY Famous CORNELL BRASS FLUX

-GRAM

ABLE FOUNDRIES
IFYING METHODS.
CREATES CHEMICAL
SLAG FLOW-OFF IS
INGS OF SUPERIOR
TERS AND HARD
FLUX COSTS JUST A
ACT NOW

A little Famous Cornell Cupola Flux does wonders for each cupola charge of iron. Sulphur and digging out is greatly reduced. Hundreds of leading gray iron and malleable foundries with cupolas regularly use Famous Cornell Cupola Flux. Why not have a Cornell representative call on you now!

*Or write for* ***Bulletin 46-B.***



***"often imitated but never equalled"***

***The* CLEVELAND FLUX *Company***

**1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO**

***Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918***

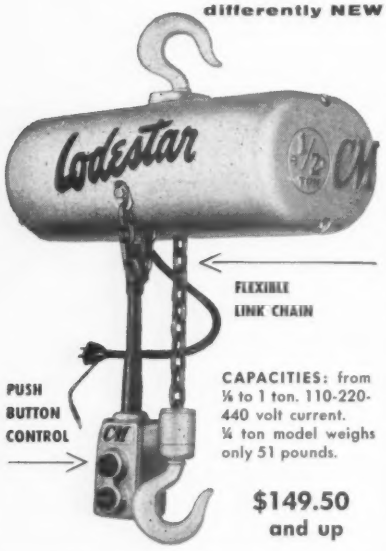
FAMOUS CORNELL FLUXES

Trade Mark Registered

FOR HEAVY DUTY FOUNDRY SERVICE AT A SURPRISINGLY LOW PRICE...

Lodestar®

ENTIRELY NEW
differently NEW




CAPACITIES: from ⅛ to 1 ton. 110-220-440 volt current. ¼ ton model weighs only 51 pounds.

$149.50 and up

...THE FIRST TRULY "HEAVY DUTY" VERSION OF THE SMALL ELECTRIC HOIST

Featuring:

- Push Button Control
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WRITE US
or call your CM distributor for literature, prices and quick delivery from stock.

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McKinnon Columbus Chain Ltd., St. Catharines, Ont.

Circle 621 on Inquiry Card—Page 51

# Readers' Comment

## The Investment X Process

TO THE EDITORS:

In the article on the Investment X Process in March FOUNDRY, page 116, I am somewhat concerned over the fact that no mention was made of our company here in America from whom the article emanated.

Inasmuch as we are licensing the process here in the United States and already have licensed two of the major investment casters to use this process, it might have been helpful in the event that people were interested in further information, etc.

I am sure that if you are contacted by anyone pursuing the possibility of taking out a license you would refer them to us.

IRWIN LUBALIN
*Shaw Process Development Corp.*
*80 Shore Rd.*
*Port Washington, N. Y.*

* * *

## Short Courses May Be Answer

TO THE EDITORS:

I read the letter from William S. Thomas (March, p. 92) on plain talk for the foundryman, and Ralph L. Lee's column on bridging the gap between the man in the laboratory and the man in the shop (p. 186) with sympathetic interest, and have found myself in agreement with both of them on most points.

One of the major headaches in any research organization serving a particular industry is how to put acquired knowledge across to the man on the shop floor. Here, at the British Cast Iron Research Association, we have tried a variety of means: The spoken word (personal visits and advice to foundries on individual problems, study courses and technical conferences); the printed word (reports, abstracts, and textbooks); and have also made occasional use of films.

One factor of great importance is undoubtedly education; not only education at the level required to master the examples of terminology quoted by Mr. Thomas (which is to some extent catered to by higher foundry education in both our countries), but also by education at a more practical level.

It is in this field that the BCIRA has broken fresh ground in recent years by organizing four-day courses at headquarters at frequent intervals on the properties and control of molding sand. Since April, 1951, upwards of 500 personnel from foundries in the United Kingdom have attended this course, which is essentially practical in nature and requires the active participation of those attending. These courses are very much appreciated and already 80 applications have been received for the current year.

Whether this type of short-term training can, with our limited resources, be extended to other subjects, is a question we have constantly under review.

G. R. WOODWARD
Manager
Intelligence Department
*British Cast Iron Research Assn.*
*Bordesley Hall*
*Alvechurch, Birmingham, England*

* * *

## An Old-Time Issue

TO THE EDITORS:

In digging through some old papers I came across an old issue of THE FOUNDRY magazine. This issue is dated May 10, 1893, is Volume II, No. 9, and is complete and in fairly good condition.

It was interesting to note that some of the companies which advertised in 1893, such as Buffalo Forge, Frederic B. Stevens, and B. F. Sturtevant are still in business and advertise in today's FOUNDRY magazine.

Inasmuch as it is one of the earlier issues, the thought occurred that you might be interested in adding this copy to your collection.

T. J. MATHEWS
Sales Engineer
*J. O. Ross Engineering Corp.*
*9225 Grand River Ave.*
*Detroit 4, Mich.*

* * *

## "A Voice in the Wilderness"

TO THE EDITORS:

At the conclusion of a recent business meeting in New Orleans, several of us took a short excursion ride around the New Orleans harbor. The steamer had a commentator who pointed out various historical points of interest.

As we were passing a certain wharf, the commentator drew our attention to a dozen gondola cars loaded with iron and steel scrap on the dock, the contents of which were being transferred to a German ship. He commented on the fact that all of this scrap was being shipped to Germany and that it would be lost forever to the American iron and steel industry. He went on to say that many of us probably remembered the horrendous

*Miss Liquidizer advises:*
*Weight Reducing Is Not*
*Without A Plan!*

Photo by H. Armstrong Roberts

## *Soffel's*
# *CARBON FREE LIQUIDIZER*

**ENABLES YOU TO DRASTICALLY REDUCE THE SIZE OF YOUR FEEDING HEADS**

Your plan for increased yield will be effective when you use SOFFEL'S Carbon-Free Liquidizers. Our Carbon-Free Liquidizers for iron, steel, nodular iron, and non-ferrous alloys assure more sound shrink-free castings from each ladle of metal poured.

*Contact your PMP Co. Distributors for a demonstration.*

**PITTSBURGH METALS PURIFYING CO., Inc.**
**1352 Marvista St., N. S. Pittsburgh 12, Pa.**

**"WORLD'S LARGEST MANUFACTURER OF FLUXES, PURIFIERS AND EXOTHERMIC COMPOUNDS FOR ALL METALS AND ALLOYS"**

- **eliminate shrinkage and piping**
- **keep feed metal molten, longer**
- **aid directional solidification**
- **permit reduction in riser size — more castings poured from each heat**
- **smaller risers reduce melting and cleaning costs and improve casting finish**
- **chemical and physical properties of the metal are not altered**

Have you considered the advantages FOSECO exothermic compounds offer *your foundry?* Over the past few years, many American foundrymen have established FEEDEX, FERRUX and FEEDOL as reliable aids in producing consistently sound castings. Grades are available for all metals.

**FOSECO FEEDEX** is an exothermic anti-piping compound which can be molded to any shape and used as sleeves, feeding pads, breaker cores, etc.

**FOSECO FERRUX** is a high heat producing and insulating hot topping compound for iron and steel.

**FOSECO FEEDOL** is a high heat producing and insulating hot topping compound for aluminum and copper-based alloys.
Investigate this range of FOSECO exothermic compounds to see how they can help *your foundry* overcome the costly problem of scrap loss due to shrinkage.

***Prefabricated Feedex Sleeves: Feedex sleeves are now available in a wide range of sizes and can also be supplied to your own special requirements. Feedex sleeves come in easy to store cartons. Ask us about applications in your foundry.***

**FOUNDRY SERVICES, INC.**
2000 BRUCK STREET COLUMBUS 7, OHIO
In Canada: FOUNDRY SERVICES (CANADA) LTD., 201-7 Alice St., Guelph, Ontario

**Clip and mail this coupon today. We'll be happy to send you a leaflet describing FEEDEX, FERRUX and FEEDOL applications.**

Name_____
Company_____
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City_____ State_____


exports of scrap to Japan in 1939, which was later shot back at us.

Naturally, we made a point of meeting the commentator when we left the ship. He turned out to be a former serviceman. We filled him in on the background of the present foundry industry protests over the export of scrap and commended him on his perceptive attitude in this regard.

This man told us that he thought he was a "voice in the wilderness" but that henceforth he would be only too glad to strengthen his comments in connection with scrap, in view of the fact that he had been assured that this situation was more serious than he had thought.


DONALD H. WORKMAN
Executive Vice President
*Gray Iron Founders' Society*
*National City-East Sixth Bldg.*
*Cleveland* 14, *O.*


* * *

## The Fundamentals of pH

TO THE EDITORS:

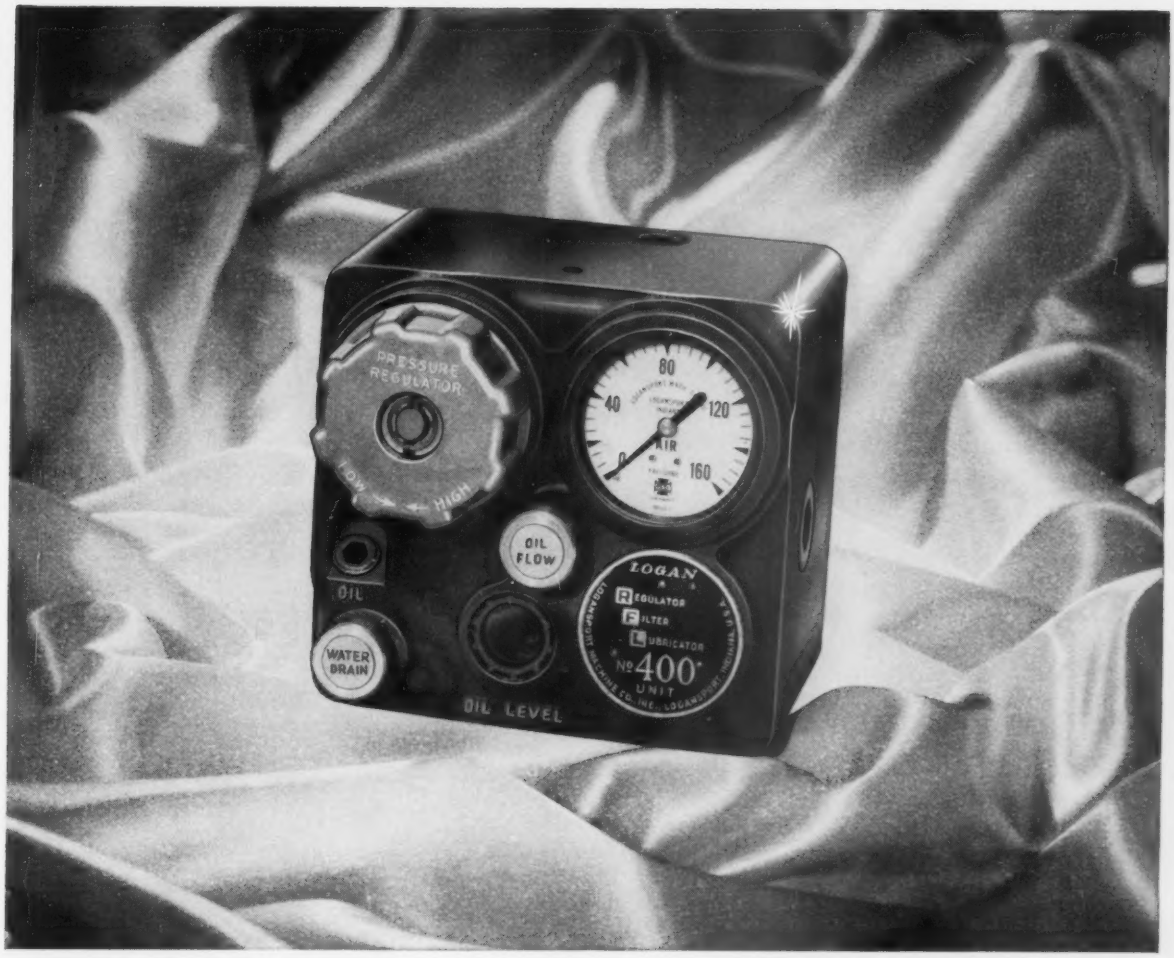
I have just read the April issue of FOUNDRY and wish to thank you for the splendid coverage you gave to the Wisconsin Foundry Conference. It certainly is very complete. Again sincere thanks.

I also have read with mixed feelings the article "Practical pH Control" by Edward C. Zuppann. This article does not discuss the fundamentals involved when the pH of sand is changed and, instead of assisting the foundryman, it will add to his confusion. Sodium carbonate is the usual addition agent added to sand. Its action is to change the physical characteristics of the clay which makes it act as a better bonding agent for the sand, and thereby imparts to the sand changes in its physical properties.

pH itself does nothing; it is simply a yardstick of measurement, the same as a thermometer. You cannot tell the weather by looking at a thermometer. It will tell you if it is warm or cold but will not tell you if it is raining or snowing. Neither does pH tell anything about the physical properties of the sand.

Apparently, Mr. Zuppann has found he can make better castings if he adds sodium carbonate to his sands, and it is my opinion that other operators could also improve their product if the fundamentals of the process were better understood. I hope some day you may present this information to the trade.


GEORGE J. BARKER
Professor of Mining & Metallurgy
*College of Engineering*
*University of Wisconsin*
*Madison* 6, *Wis.*




*Illustrated—Logan Model 400 RFL Unit*

# Look to Logan

## the ultimate in air circuit accessories

Logan RFL Unit, the designers choice for over a decade! Protects your air-powered equipment . . . regulates pressure . . . filters air . . . lubricates air. Adds years of dependable performance.

New Model 400, illustrated above, is a companion model to the well-known Model 600.

**FREE** SEND FOR THE "LOGAN CALCULATOR"

MEMBER: Natl. Mach. Tool Builders' Assn.; Natl. Fluid Power Assn.

**LOGANSPORT MACHINE CO., INC.**
**850 CENTER AVENUE, LOGANSPORT, INDIANA**

PLEASE SEND COPY OF CATALOG:

- ☐ 100-1 AIR CYLINDERS
- ☐ 100-2 MILL-TYPE AIR CYLS.
- ☐ 100-3 AIR-DRAULIC CYLS.
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Circle 624 on Inquiry Card—Page 51

# you can mold solid savings with Sterling Flasks

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WHEREVER METALS ARE CAST FOUNDRY
June 1957

# Castings on Display

Many of the questions which arose when the 1st Engineered Castings Show was announced by the American Foundrymen's Society now can be answered.

A sizable number of foundries staged interesting and instructive exhibits in the Music Hall at Cincinnati. Although a high percentage of these companies previously had not participated in industrial shows, their exhibits had a professional touch and an attractiveness that made them most appealing to the viewing audience.

All types of metals, both ferrous and nonferrous, were shown, and every method of casting was represented. Castings made in sand, shells, cores, plaster, permanent molds, centrifugal molds and dies were on display. Castings ranged from a fraction of an ounce to several tons and from plain parts to intricate core work. Persons inspecting the display surely obtained an excellent idea of the wide range of products, measured in size, complexity and physical properties, provided by the casting process.

Although the number of design engineers and buyers of castings in attendance was somewhat disappointing, exhibitors were highly pleased with the type of casting users at the show. Some brought blueprints and asked for quotations, and others evidenced keen interest in the potentials of castings.

With a record attendance of approximately 5500 at the convention and show, large numbers of foundrymen inspected the castings on display. Undoubtedly the industry benefited from that phase of the show, for many reported that they were quite impressed with the excellence of the castings produced by their contemporaries. Some remarked that they had missed a bet in not exhibiting.

The foundry industry needs more promotion of its products to design engineers and buyers of castings. Industrial shows, such as the Engineered Castings Show, form a part of such promotion. Whether it be at the 2nd Engineered Castings Show, which AFS President Frank Shipley announced would be held in 1959, or at other industrial shows, more foundries should participate actively in this field of sales promotion.

Exhibitors and those in charge of this first castings show undoubtedly learned much from the experience at Cincinnati. Applying these lessons should produce a bigger show and a much larger audience of designers and buyers in 1959.

Frank G. Steinebach
Editor

## *Record Attendance Marks*

# AFS Castings Congress

FOUNDRYMEN gathered in record number at Cincinnati, May 6-10, for the annual American Foundrymen's Society Congress and the first Engineered Castings Show. The dual attraction had a total registration of close to 5500—well above the attendance at previous odd-year meetings without exhibits of equipment and supplies.

Although the extensive program of technical papers was of primary interest to foundry operators, the excellent variety of castings on display at the Show (see Page 94) likewise commanded considerable of their attention.

Discussions of foundry technical subjects encompassed a wide variety of subjects, with emphasis given to the newer operating practices, quality control, and casting fundamentals. Reports on various of the technical sessions start on Page 190.

**Business Meeting**—The annual business meeting featured a brief report of the president, election of officers, presentation of the 1957 apprentice contest awards and the presentation of AFS service citations and awards of merit.

Frank W. Shipley, Caterpillar Tractor Co., Peoria, Ill., and president of the AFS, spoke briefly on some of the progress which the society has made during the past year. Membership at the opening of the convention was 13,194, the highest on record. The society has 58 chapters including regular and student, and the many technical committees of the society are most active. Two new divisions are contemplated, one on die casting and the other on ductile iron. During the year, four new books were published, eight research projects were carried on, the AFS Training and Research Institute was formed and the first Engineered Castings Show was held.

Winners of the 1957 apprenticeship contest were announced as follows:

*Wood Patternmaking*—Richard R. Dvorak, Consolidated Pattern & Mfg. Co., Brentwood, Mo.; Vernon S. Koch, Caterpillar Tractor Co., Peoria,

Left to right are Harry W. Dietert, Harry W. Dietert Co., new president of AFS; H. F. Barr, Chevrolet Division, General Motors Corp., who spoke on "Castings Engineering"; and Frank W. Shipley, Caterpillar Tractor Co., retiring AFS president

HARRY W. DIETERT
*President*

L. H. DURDIN
*Vice President*

Ill.; Richard J. Schmid, Suburban Pattern & Model Co., N. Collingswood Heights, N. J.

*Metal Patternmaking*—William Kuschel, Annex Pattern Co., Detroit; Maurice E. Salsbury, Ford Motor Co., Cleveland Foundry, Berea, O.; Clifton Evans, City Pattern & Foundry Co., Detroit.

*Iron Molding*—Raymond J. Hollfelder, Zenith Foundry Co., Milwaukee; Ronald Henderson, Olney Foundry, Link-Belt Co., Philadelphia; Ralph W. Tolle, Waupaca Foundry Inc., Waupaca, Wis.

*Steel Molding*—Arnold L. See, Waukesha Foundry Co., Waukesha, Wis.; Nathan Rosier, Atlas Foundry & Machine Co., Tacoma, Wash.; Elden C. Willing, Waukesha Foundry Co., Waukesha, Wis.

*Nonferrous Molding*—Naaman Peterson, Puget Sound Naval Shipyard, Bremerton, Wash.; Robert Weber, City Terrace Foundry Co., Los Angeles; George Martinez, Bay City Foundry, Wilmington, Calif.

Due to the difficulty in clearing the entries from the Eastern Canada and Ontario Chapters through U.S. customs, those entries did not arrive in time to be judged with the main contest, and therefore a special Canadian contest was provided for this convention. Winners of the Canadian contest were as follows:

*Wood Patternmaking*—M. Moon, Dominion Engineering Works, Lachine, Que.; M. Hannah, Western Pattern Works; Robert Hawkins, International Harvester Co. Ltd., Hamilton, Ont.

*Metal Patternmaking*—William Harris, International Harvester Co. Ltd., Hamilton.

Registration facilities were set up at both the Music Hall and the Netherland Hilton Hotel. This view shows a registration scene at the Music Hall

# New AFS Directors

JOHN R. RUSSO

ALLEN M. SLICHTER

A. A. HOCHREIN

KARL L. LANDGREBE JR.

*Iron Molding*—J. Ridorossi, Montreal Technical School, Montreal, Que.; J. C. Ferron, Three Rivers Technical School, Three Rivers, Que.; G. Brunet, Dominion Engineering Works, Lachine, Que.

*Steel Molding*—A. Beaupre, G. Cholette and J. Smith, all from Dominion Engineering Works, Lachine, Que.

*Nonferrous Molding*—J. Bedard, Three Rivers Technical School, Three Rivers, Que.; and R. Lord, Dominion Engineering Works, Lachine, Que.

**Awards**—Edwin W. Horlebein, president, Gibson & Kirk Co., Baltimore, and acting chairman of the Board of Awards, presented three service citations and four awards of scientific merit. Service citations were presented to Thomas E. Barlow, sales manager, Eastern Clay Products Department, International Minerals & Chemical Co., Chicago; Horace A. Deane, vice president, Campbell, Wyant & Cannon Co., Div. of Textron Inc., Muskegon, Mich.; and Vincent Delport, European manager of FOUNDRY, London, England.

Awards of scientific merit were presented to Manley E. Brooks, foundry engineer, Dow Chemical Co., Bay City, Mich.; Richard W. Heine, associate professor of metallurgical engineering, University of Wisconsin, Madison, Wis.; Walter R. Jaeschke, consulting metallurgical engineer, foundry equipment division, Whiting Corp., Harvey, Ill.; Arthur E. Schuh, director of research, U.S. Pipe & Foundry Co., Burlington, N. J.

**Officers and Directors**—Election of new officers and directors of the society was announced by William W. Maloney, general manager.

*Harry W. Dietert,* who succeeds Mr. Shipley as president, just completed a term as vice president and was a director for three years. Chairman of the board, Harry W. Dietert Co., Detroit, he was graduated from the University of Illinois in 1923. After a short period with U. S. Radiator Co., Detroit, Mr. Dietert formed his own company. He has been active in AFS committee work, was the McFadden medalist in 1940 and Hoyt lecturer in 1954.

*L. H. Durdin,* elected vice president, is president, Dixie Bronze Co., Birmingham, and a past president of the Non-Ferrous Founders' Society. Graduated from the University of Illinois in 1929 and from Babson Institute in 1930, Mr. Durdin was with Chicago Pump Co. and later was plant manager, Line Material Co., Birmingham, until joining Dixie Bronze Co. as president in 1946.

*Frank W. Shipley,* retiring president of the society, becomes a director for one year. Directors elected for three years are:

*Henry G. Stenberg,* foundry superintendent, Draper Corp., Hopedale, Mass. Mr. Stenberg attended the University of New Hampshire and at one time was with Hamlin Brass Foundry, Union, N. H., Universal Winding Co., Providence, R. I., Warren Pipe & Foundry Co., Everett, Mass., and Rice, Barton Corp., Worcester. He was foundry superintendent for Draper at E. Spartanburg, S. C., before going to Hopedale in 1944.

*A. A. Hochrein,* district manager, Federated Metals Div., American Smelting & Refining Co., Baltimore. He has been with the company since 1923 and was named manager of the Baltimore office in 1932. Long active in the AFS Chesapeake Chapter, he was its chairman in 1950-51.

*William D. Dunn,* assistant to the president, Oberdorfer Foundries Inc., Syracuse, N. Y. Graduated from Syracuse University, Mr. Dunn for a number of years was with Frazer & Jones Co., Syracuse. Subsequently he was general superin-

HENRY G. STENBERG

WILLIAM D. DUNN

CHARLES E. DRURY

FRED J. PFARR

tendent, Acme Steel & Malleable Iron Works, Buffalo, and later was superintendent, Marion Malleable Iron Works, Marion, Ind. He joined Oberdorfer in 1943. Mr. Dunn is a past chairman of the AFS Central New York Chapter.

*Fred J. Pfarr,* manager, Lake City Malleable Co., Cleveland. Mr. Pfarr joined the company in 1929, serving in various capacities prior to appointment to his present position in 1946. He is a past chairman of the Northeastern Ohio Chapter.

*Karl L. Landgrebe Jr.,* vice president, foundry operations, the Wheland Co., Chattanooga, Tenn. Graduated from Cornell University, he was with Steel Sales Corp., Chicago, and Ford Motor Co., Dearborn, Mich., before joining Wheland in 1946 as foundry superintendent. Mr. Landgrebe is a past chairman of the Tennessee Chapter.

*John R. Russo,* president, Russo Foundry Equip-

Past presidents of AFS got together at a luncheon during the congress. Among those present, seated, left to right, were Walter L. Seelbach, Edwin W. Horlebein, Fred J. Walls, Ralph J. Teetor, Wyndham R. Bean, Dr. Guilliam H. Clamer and Hyman Bornstein. Standing, from left to right, Frank J. Dost, S. C. Massari (technical director, AFS), Bruce L. Simpson and I. Richards Wagner

Hyman Bornstein presented the Hoyt Memorial Lecture

President Shipley presents awards to apprentice contest winners. Left to right, Richard Dvorak, Raymond Hollfelder, Arnold See and William Kuschel

ment Co., Oakland, Calif. Mr. Russo entered the foundry industry with Carondelet Foundry Co., St. Louis, in 1924. Other foundry connections included Chicago Hardware Foundry Co., North Chicago, Ill., and General Metals Corp., Oakland. He was general sales manager, Pacific Graphite Works, Oakland, before founding his own company in 1948. He is a past president of the Northern California Chapter.

*Allen M. Slichter,* president, Pelton Steel Casting Co., Milwaukee, is the new director elected annually by the AFS board of directors. Graduated from the University of Wisconsin in 1918, he joined Pelton as secretary in 1925 and has been its president since 1947. He is a past vice president of the Steel Founders' Society of America.

*Charles E. Drury,* manager, Danville, Ill., plant, Central Foundry Division, General Motors Corp., recently was appointed a director for two years to fill the unexpired term of R. V. Righter. The latter, who preceded Mr. Drury as Danville manager, was transferred to the staff of the vice president in charge of personnel of General Motors at Detroit. Graduated from the University of Illinois, Mr. Drury was with Caterpillar Tractor Co., Peoria, Ill., before joining Central Foundry Division in 1949.

**Hoyt Memorial Lecture**—The annual Charles Edgar Hoyt Memorial Lecture was presented by Hyman Bornstein, retired director, testing and research laboratory, Deere & Co., Moline, Ill., and a past president of the society. The subject was "Progress in Iron Castings." In opening his lecture, he paid tribute to the many contributions to the industry made by the late Charles E. Hoyt in his years as secretary of the AFS.

Mr. Bornstein's talk covered many developments in the field of gray and white iron, malleable and pearlitic malleable irons, and nodular iron. One measurement of progress indicated by the lecturer was the great improvement in properties of gray and white iron and the effects of composition, melting practices and heat treatments in the development of higher physical properties. Consideration also was given to the use of alloys in obtaining desired engineering properties.

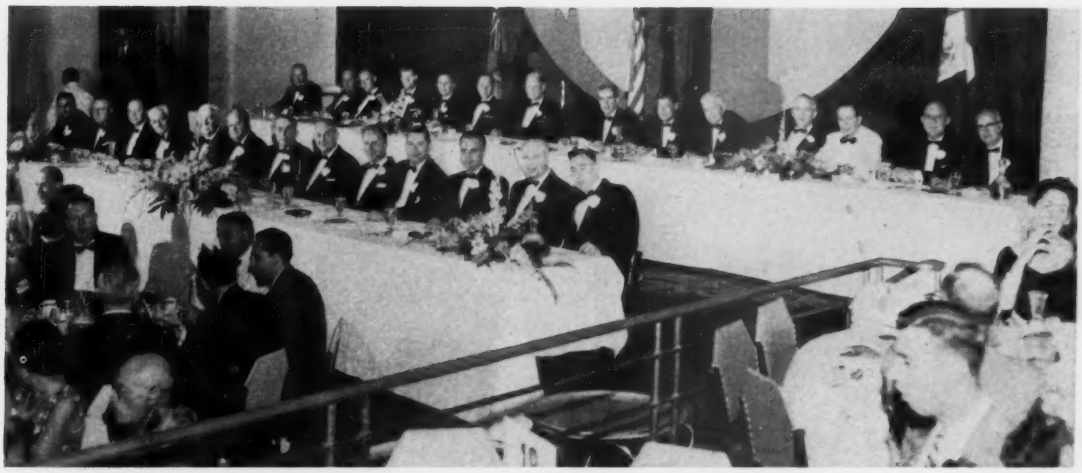
He stated that malleable castings have become better and more uniform in quality. Some of the improvement is due to advances in metallurgy, but to a considerable extent, the progress has come from advances in equipment which provide better melting practices and more controllable heat treatment. While pearlitic malleable iron is a fairly recent product, it has become important due to the recognition of its properties, such as strength, hardness and wear resistance.

Nodular iron is the newest member of the family and is growing fast. It is being used for many important applications where high strength or ductility or both are required.

Mr. Bornstein observed that uniformity of quality and dimensional control are important considerations to provide customers. In maintaining quality, process control is important and its use has been extended. In conclusion, the lecturer stated that the casting industry is a dynamic one. There is competition within the industry and with products outside the industry. While the customer is always on the lookout for a better product and, if possible, a lower cost, the progressive foundry constantly is at work to reach those objectives.

**Annual Dinner**—The annual dinner featured an exceptional choral program by the Cincinnatians under the directorship of Clare Kennedy, the awarding of three gold medals of the society, and a splendid talk by Warren Whitney, vice president, James B. Clow & Sons, Birmingham. Frank W. Shipley, president of the society, presided.

Edwin W. Horlebein, as acting chairman of the Board of Awards, presented the John A. Penton Gold Medal of the society to Johannes C. Croning, head of Croning & Co., and of Mikroforma G.m.b.H. of Germany; the Peter L. Simpson Gold Medal to Charles K. Donoho, assistant technical director, American Cast Iron Pipe Co., Birmingham; and the John H. Whiting Gold Medal to Clyde A. Sanders, vice president, American Colloid Co., Chicago.



View of speakers tables at the annual dinner of AFS. Gold medal recipients Clyde A. Sanders and Charles K. Donoho are seated at the rear table

Thomas E. Barlow, left, receives his service citation from Edwin W. Horlebein, right, as Horace A. Deane, also honored with a citation, looks on. A third citation was made to Vincent P. Delport, who was unable to be present

Awards of scientific merit were presented by Mr. Horlebein, left. The recipients, from left to right, are Manley E. Brooks, Walter R. Jaeschke, Richard W. Heine and Arthur E. Schuh

Exhibits at the Castings Show were situated in three different locations. This view shows the over-all appearance of one of the smaller display areas

### *High-Quality Products Feature*

# Engineered Castings Show

VISITORS to the AFS Engineered Castings Show in Cincinnati last month saw the most diversified group of high-quality foundry products ever assembled for an exhibit in the United States.

About two-thirds of the approximately 100 exhibitors were foundries. Patternmakers, producers of metals and alloys, and manufacturers of laboratory, testing and inspection equipment sponsored the other displays.

The fact that the foundries represented included many different types added to the diversity of the castings shown. Parts ranged in size from miniature investment castings to huge engine blocks and tire molds. Grades of castings varied from the commoner types of ferrous and nonferrous metals to special alloys, titanium and zirconium.

While the emphasis was on products rather than processes, visitors had an opportunity to observe actual foundry operations from a telecast arranged by Peerless Foundry Co., Cincinnati gray iron foundry. Over a closed circuit from its plant to screens at its booth in the show, the company brought a live program of production scenes several times each day. Doehler-Jarvis Division, National Lead Co., operated a die casting machine at its booth.

Foundrymen attending the Castings Congress far outnumbered casting buyers among the show visitors, but exhibitors generally expressed satisfaction over the interest and definite buying intentions shown by designers and purchasers. Casting buyers were interested particularly in applications of a special or problem nature, a number of exhibitors reported.

The high quality of castings exhibited provided an inspirational value for many foundrymen viewing the show by demonstrating the work produced by their contemporaries.

GREDE FOUNDRIES, INC.

WAGNER MALLEABLE IRON CO
ENGINEERED CASTINGS

Peerless
engineered castings

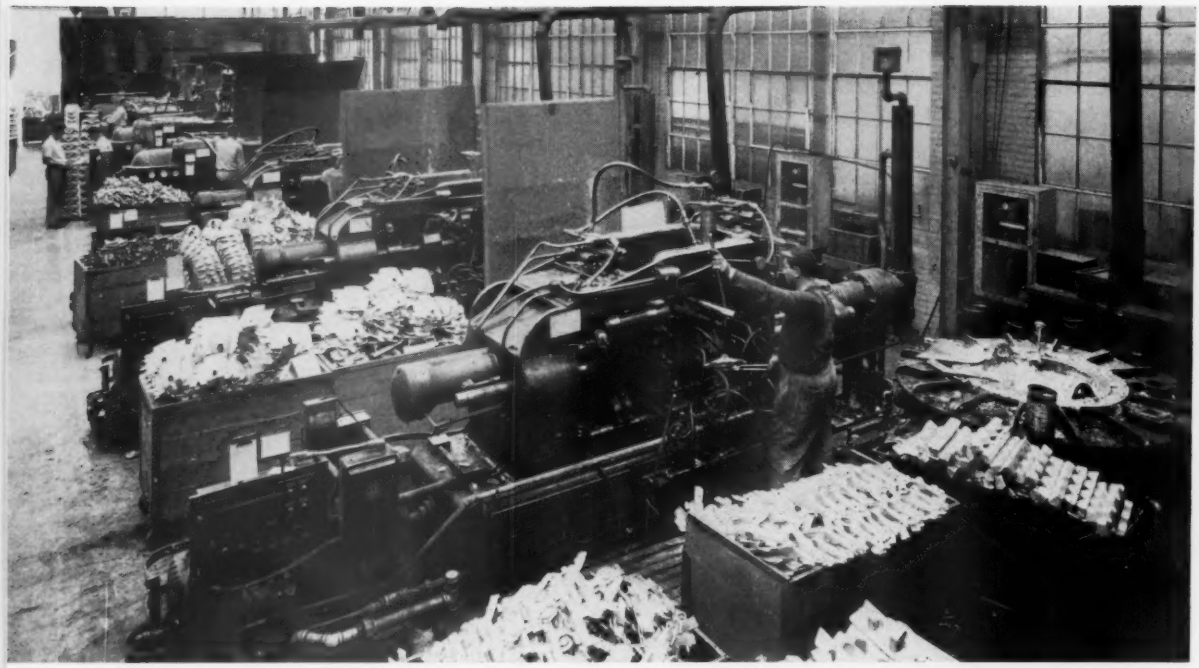
THE EASTERN MALLEABLE IRON CO

# Engineered Castings Show

BADGER
MALLEABLE & MFG. CO.

the ADVANCE foundry co.

ROLLE



Thirty-five die casting machines are used in making castings for the company's products and those of other manufacturers and government agencies

# DIE CASTING

## ... at the Hoover Co.

**Intensive engineering preplanning, a continuing research program, and rigid quality control standards are integrated with 35 years of die casting experience to produce high-quality castings**

By KENNETH L. MOUNTAIN
*Associate Editor*

Automatic machine for pigging aluminum melted in reverberatory furnace. A variety of rigidly controlled aluminum and zinc alloys is produced

THE Hoover Co. has been making electric vacuum cleaners since 1908. In recent years, other electrical appliances have been added to its line of products. Considerable engineering ability and production skill is evident at the company's North Canton, O., Main Works, where 2300 employees (1600 in production jobs) on two full shifts and part of a third shift are producing several models of vacuum cleaners, floor polishers, coffee pots, hand mixers and electric and steam irons.

About 700,000 sq ft of floor space is used to house the hundreds of manufacturing processes essential to the manufacture of components for these products. Projected future expansion will provide an additional 200,000 sq ft.

Die casting is only one element of the company's total manufacturing operations, but it is a sizable segment, and in each year since 1922 die casting has played an increasingly important role in the company's manufacturing achievements.

In addition to die casting parts for its own products, the Hoover Co. engages in research, development and production work for other manufacturers and government agencies. Castings produced for others find wide application as components in automobiles, aircraft, business and office machines, small motors, electrical appliances, hand tools, television antennas, motion picture projectors, farm implements and many other types of products.

Today, thirty aluminum die casting machines (nineteen 400-ton units, ten 600-ton units and one 800-ton unit) turn out about 900,000 lb of finished castings monthly. Five zinc machines (three 250-ton units and two 400-ton units) turn out about 500,000 lb of finished castings monthly. Aluminum castings up to 12 x 12 in. and 8 lb and zinc castings 7 x 10 in. and 5 lb can be produced.

**Alloying Department**—An alloying department is equipped to produce ingots to meet standard as well as company specifications. Two reverberatory furnaces of 15,000-lb capacity each provide a 60,000-lb daily aluminum alloying capacity. Two crucible furnaces are used to remelt and alloy zinc ingots. Aluminum ingots are made in automatic pigging machines which are an integral part of the remelting furnaces. Remelted zinc is hand ladled into ingot molds.

In each aluminum heat, about 25 per cent virgin metal is added to scrap castings, purchased secondary ingot and some primary aluminum scrap—a byproduct from other Hoover processes. Same percentages apply to zinc. Preliminary raw material handling is minimized since palletized ingots are received at an unloading area near the alloying department and stored outside until needed. In-plant remelt material is transported to the alloying department in tote boxes by lift truck.

Although several aluminum and zinc alloys are used, depending on the properties desired and the end-use of the casting, most Hoover die castings are made with two basic alloys—ASTM 23 (zinc) and ASTM SC-7 (aluminum)—or slight modifications of them. These alloys are used because of their castability, dimensional stability and physical and mechanical properties.

**Metal Analysis**—The zinc alloy has the following analysis: Cu 0.10 max, Sn 0.005 max, Pb 0.007 max, Fe 0.10 max, Cd 0.005 max, Mg 0.03-0.08,

Al 3.5-4.3 Remainder is high-purity zinc. This alloy will produce castings with 35,000 psi tensile strength, elongation of 10 per cent in 2 in., and a Charpy value of 35 ft-lb.

The aluminum alloy has the following analysis: Cu 3.0-4.0, Si 7.5-9.5, Sn 0.3 max, Zn 1.0 max, Fe 2.0 max, Ni 0.50 max, Mg 0.10 max, Mn 0.50 max and others, total 0.50 max. Remainder is high purity aluminum. This alloy will produce castings with 43,000 psi tensile strength, 25,000 psi yield strength, elongation of 2 per cent in 2 in., and a Charpy value of 3.2 ft-lb.

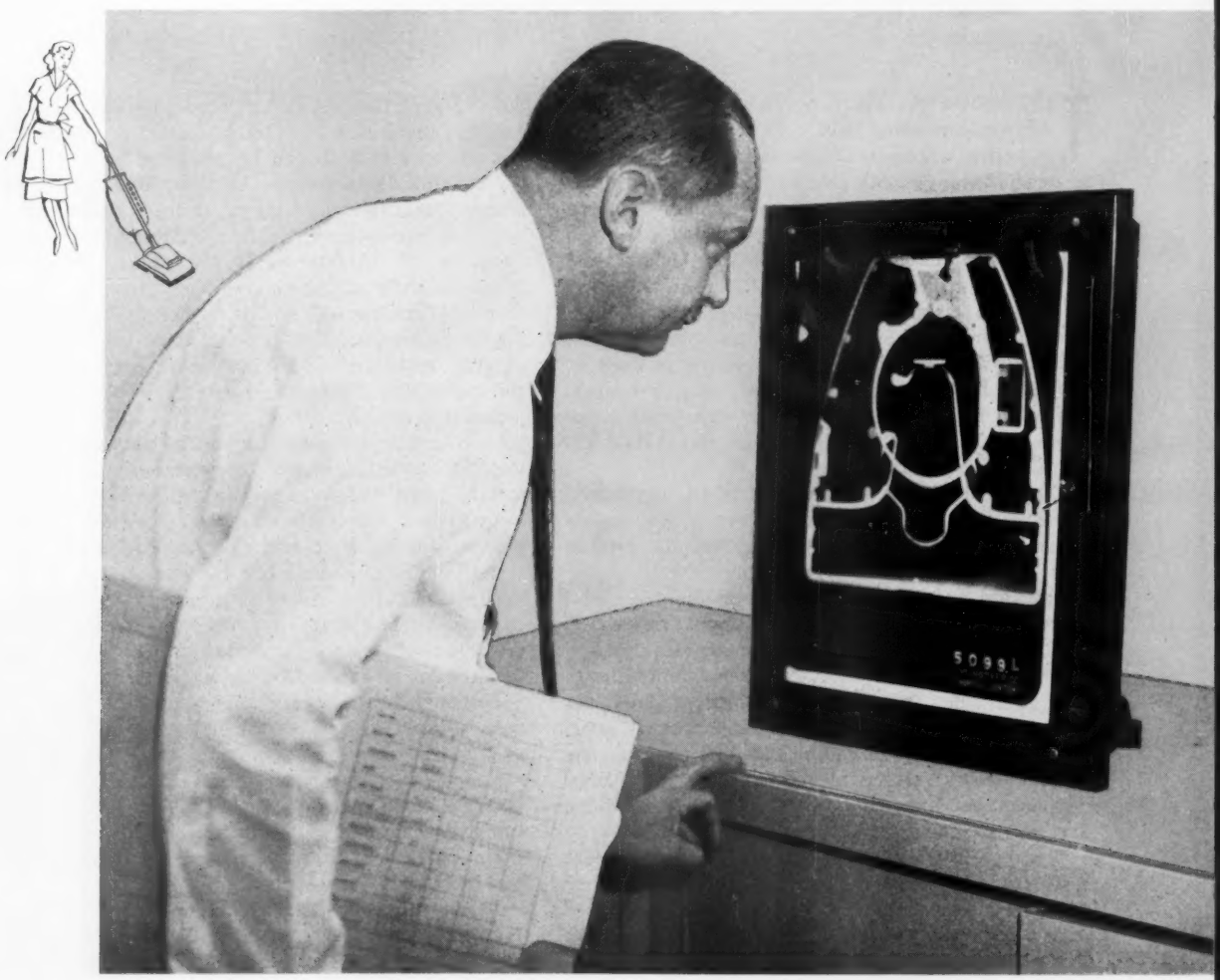
Before any alloy is used, sample ingots go to the laboratory for spectrographic analysis. A Litrow spectrograph completes an analysis faster and more accurately than possible with chemical methods. Chemical analysis serves as a check on the standards used in the Litrow unit. Close control is exercised to assure that alloys meet ASTM specifications as well as those of the Certified Zinc Die Casting Plan of the American Die Casting Institute. Metal is held in the furnaces until the check has been completed.

Fork trucks transport alloyed pigs to the die casting machines in metal baskets. Zinc and aluminum machines are in separate buildings, an arrangement which aids remelt control through metal segregation.

**Die Casting**—Metal is melted in pot-type, gas-fired furnaces. Each aluminum machine has an 800-lb capacity furnace adjacent to it from which the operator hand-ladles metal for each shot. Each zinc machine incorporates an 800-lb capacity furnace as an integral part, and a preset amount of zinc is automatically injected into the die during each cycle. Ladles for hand dipping are sized to hold only enough aluminum for a single shot.

The ejector and cover halves of the dies are maintained between 400 to 600°F, depending upon the casting. Maintaining proper die temperatures is one of the most difficult aspects of die casting production. The amount of water cooling provided, the number of shots introduced into the die and metal temperature are interrelated vital elements in keeping the die at the lowest possible temperature that will produce a dense, sound cast-

X-ray study of die castings helps Hoover engineers determine proper pressure, temperature, gating and venting to maneuver porosity away from critical areas



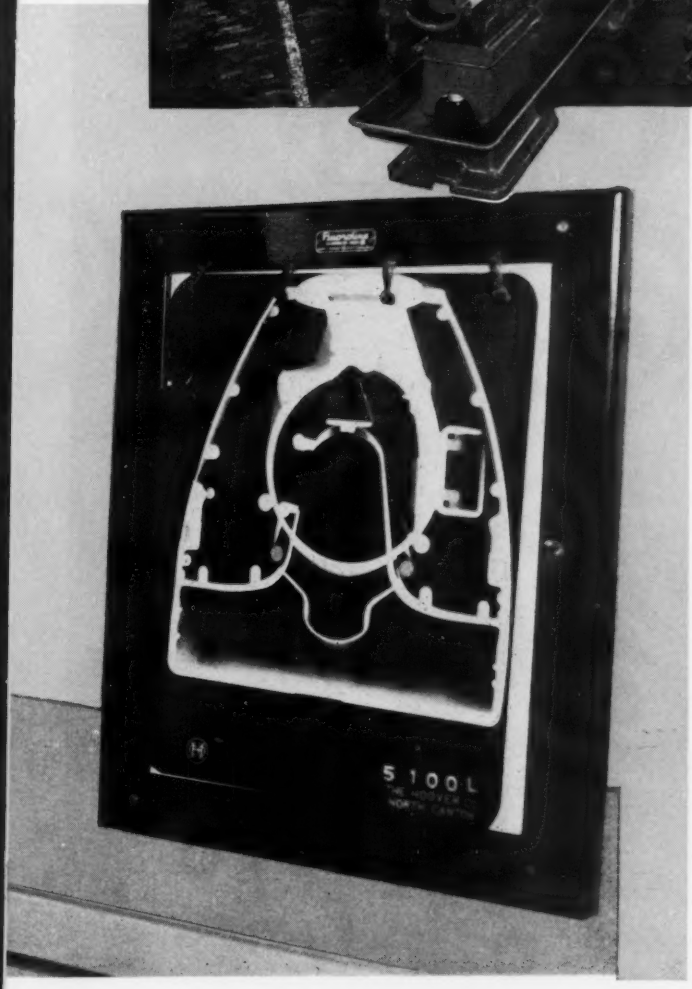
ing which possesses a good surface finish.

Water flows at 10 psi through cooling lines or channels drilled into the die blocks. Valves on the machine control the water flow through each line or channel. Operators pay close attention to the condition of the castings as they are ejected, and they regulate water flow as dictated by the appearance of the castings.

The operator actuates the machine and visually inspects castings as he removes them from the die. He looks for obvious porosity, distortion, finish, depressed or raised ejector marks, blisters, broken cores, shrinks, cracks or other visible defects. Either the operator or a helper degates the good castings, removes heavy flash and places the castings on conveyors or in tote boxes for further processing.

Castings are taken from all production runs and examined fluoroscopically for hidden flaws. An additional check is made by comparative radiographs taken with a 140-kva x-ray machine. These studies help determine proper pressure, tempera-

Over 100 skilled craftsmen in this tool and die shop make dies on the latest types of equipment




ture, gating and venting to keep critical areas of the casting free from porosity.

**Trimming and Finishing**—A variety of punch presses fitted with trim dies, an abrasive cleaning unit, polishing lathes, disc machines, tapping and milling machines, lathes and drill presses are used in machining and finishing operations. Castings are shipped rough or partially or completely finished, depending on the customer's requirements.

In general, all customer castings and many Hoover castings are transported to machining and finishing operations in tote boxes. Since the main casting for the model 64 upright vacuum cleaner is a major component of that cleaner, its production pattern differs as it is integrated into conveyorized and automated finishing operations before assembly.

The main casting is removed from the die casting machine, visually inspected, degated and placed on a conveyor which moves to the second floor. There castings are removed from conveyor, trimmed and placed in an airless blast cleaning unit. After cleaning, the castings again are conveyorized and moved to the third floor, where they undergo a series of hand filing, milling, drilling, tapping and final grinding operations before going through a 5-minute washing cycle.

After they have been inspected, castings again

are conveyorized and move through several riveting operations, during which hardware components are attached. At this point castings are placed in wire baskets and elevated to the fourth floor, where they are removed, dusted in a rotating brush unit and hung on a conveyor for prepainting.

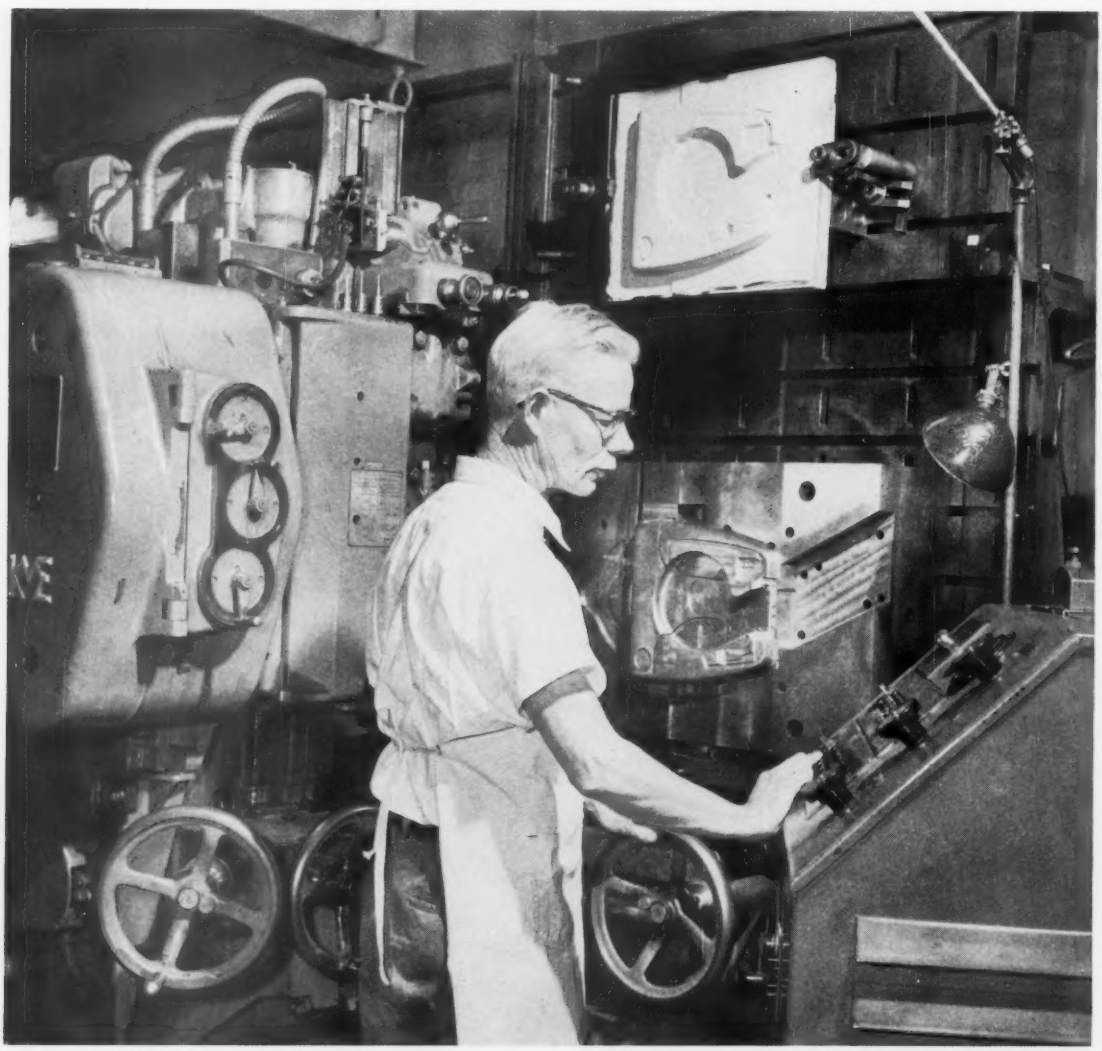
Following prepainting of the inside surfaces, the castings are hung upside down on a conveyor that moves through an automatic paint spray unit. After enameling, the castings are hung six to a rack and moved through a drying oven to bake for one-half hour at 290°F. They are inspected before being placed on an overhead conveyor for movement to final assembly.

A numbering and several riveting operations are performed as the main casting moves through the final assembly area. Subassembly of parts, mounting of the motor, agitator and handle socket and other operations are completed as the motor and the main casting become one unit. Following electrical and mechanical inspections, the cleaners are packaged and conveyorized to storage.

**Quality Control**—In a continuing effort to produce a product of consistently high quality, the Hoover Co. management gives the production division the responsibility for the quality of the parts produced as well as for the quantity. An inspection division assumes the never-ending, fact-finding, fact-giving activity that provides production with data from which to plan corrective action to prevent defects from occurring.

The quality control program begins with an attitude or philosophy toward quality. Defects common to the die casting process (shrinks, drags, cracks, bent pieces, stuck pieces, blisters, damaged, nonfill, porosity, broken core pin, broken insert, advanced sleeve and breakout) are checked by daily sampling of a number of pieces from each machine. The recorded information tells how

Replacement dies are required when production runs are continuous. These dies are machined from an original plaster master by a Keller duplicating machine



Experienced draftsmen interpret the design, electrical, mechanical, materials, processing, chemical and metallurgical functions of engineering sections

a particular job is progressing, how equipment is functioning and how good a production job is being done. The information is presented in per cent defective charts displayed in the various departments.

An operator can check his performance record against those of others. Because everyone wants to do a good job, the stage is set for the operator to assume full responsibility for quality. Additionally, better quality is obtained by developing intensive use of know-how that already exists in each department. All operators are provided with equipment and gaging compatible with desired quality levels.

Another technique is the process capability studies that are used to analyze process variation. These variations are shown graphically in a tally of readings taken by measuring 120 consecutive pieces selected from a process. These studies reveal whether or not the process is capable of consistently producing parts to blueprint specifications.

**Continuing Research** — Much of Hoover's die casting success can be attributed to a continuing research program that has accumulated data over 35 years on alloys, metal temperatures, die temperatures, injection pressures, length and timing of injection strokes and the interrelationship of these and other factors. These data give Hoover engineers the know-how to predict accurately how a production die casting machine should perform and how that machine should be operated to realize its maximum potential.

The importance of this research was emphasized recently with the completion of a new building to house an 800-ton die casting machine and necessary material handling equipment to be used solely for research purposes. This machine enables research personnel to carry on continuing studies without taking a machine out of production to carry on the experiments.

At Hoover Co., a vital by-product of their continuing research efforts is possession of thorough knowledge of the capabilities of all their die casting machines. This information permits the selection (preliminary to actual designing of the die) of the die casting machine most desirable for production of a particular casting. It assures management of successful results if the die design is workable.

In a modern, completely equipped tool and die shop, 150 skilled technicians make dies, tools, gages and fixtures for die casting and other manufacturing processes. Equipment for hardening tools, dies and molds also is available.

**Training Program**—Since 1936, a tool and die training program has provided a valuable source of skilled employees. An 8000-hour (4 year) program has developed, and 70 to 75 per cent of the company's tool and diemakers, plus additional supervisory and management personnel, have graduated from the vocational training program. At present about 40 tool and die and 12 maintenance and inspection trainees are enrolled in the program.

Die casting design at the Hoover Co. is a cooperative effort of the research, engineering, tooling and production divisions. Many conferences are held by the engineers in these sections to work out all the details of preparing the die that will cast the part.

It is the duty of an engineering section of some 125 persons to perform the design, drafting, electrical, mechanical, materials, processing, chemistry and metallurgical functions in interpreting the desires of the stylist and the product engineer into an efficient, attractive and economical vacuum cleaner.

**Preproduction Planning**—Prior to the manufacture of a vacuum cleaner a considerable amount of preproduction planning occurs. Tentative specifications for the cleaner are received in engineering from management. They cover the general features, appearance, performance and special features desired in a proposed cleaner. Wooden models are constructed, and, after engineering and styling changes, a staff engineer is assigned to co-ordinate

all advance designing and planning, testing, tooling, and co-ordination of tooling with production.

As each laboratory finishes its development, its work is submitted to the design section, and all components are incorporated into the final design. When the design is relatively stable, board designers perform layout to scale, but without dimensions. A model then is made from these layout drawings. Wooden patterns are constructed, and sand-cast aluminum parts are made and hand tooled to a finished job, complete in all respects. This model undergoes severe testing for performance. Following study and tabulation of the testing program, the drawings are dimensioned accurately.

A detailed model then is constructed by hand. This model has the exact appearance of the thousands of production models that will follow. Additional testing continues, and final changes, if any, are made prior to establishment of a production schedule.

The engineering section selects the alloys to be used for the die-cast components of the cleaner and works closely with the die designer to see that the die operates properly to handle the proposed component. Throughout all this engineering planning, a continuing effort is made to reduce clearances, heights and thicknesses to the smallest practical dimensions.

When OK'd blueprints are received in the tool engineer's office, a preliminary layout is made to determine the die block size. Depending upon the part to be cast, the required type and size of die block is ordered from commercial suppliers. Larger die block sizes need to be made to order; normal delivery of these blocks is in about two weeks.

**Design Principles**—The general principles of die design and die casting design that follow are taken from the proved experiences of the Hoover Co., and are exemplified daily in their production of quality die castings.

A good die steel should be machinable, structurally sound and uniform. It should have sufficient strength and hardness to resist deformation, high thermal conductivity to withstand drastic temperature changes, high resistance to heat checking and adequate dimensional stability to retain its dimensions in heat treatment. A chromium-base, hot work tool steel generally meets these requirements.

The final workability of the die is determined principally by the location of the parting line of the two die halves. The dies must align perfectly so that the halves will clear each other, as the die opens to eject the casting, without damage or undue stress to either the die or the casting. This alignment is assured after machining of the parting-line surface by clamping the two halves together and doweling them. The parting line generally is located at the casting cross section of greatest area, but deviations from this practice often are necessary to compromise on die costs or eliminate cores.

Die blocks are rough machined on planers and shapers and finish machined on milling machines and duplicators. Die block cavities are rough-cut to within 1/16 or ¼ in. before detailing for final dimensions. Cavities are machined to low limits and cores to high limits by splitting the mean between the tolerances.

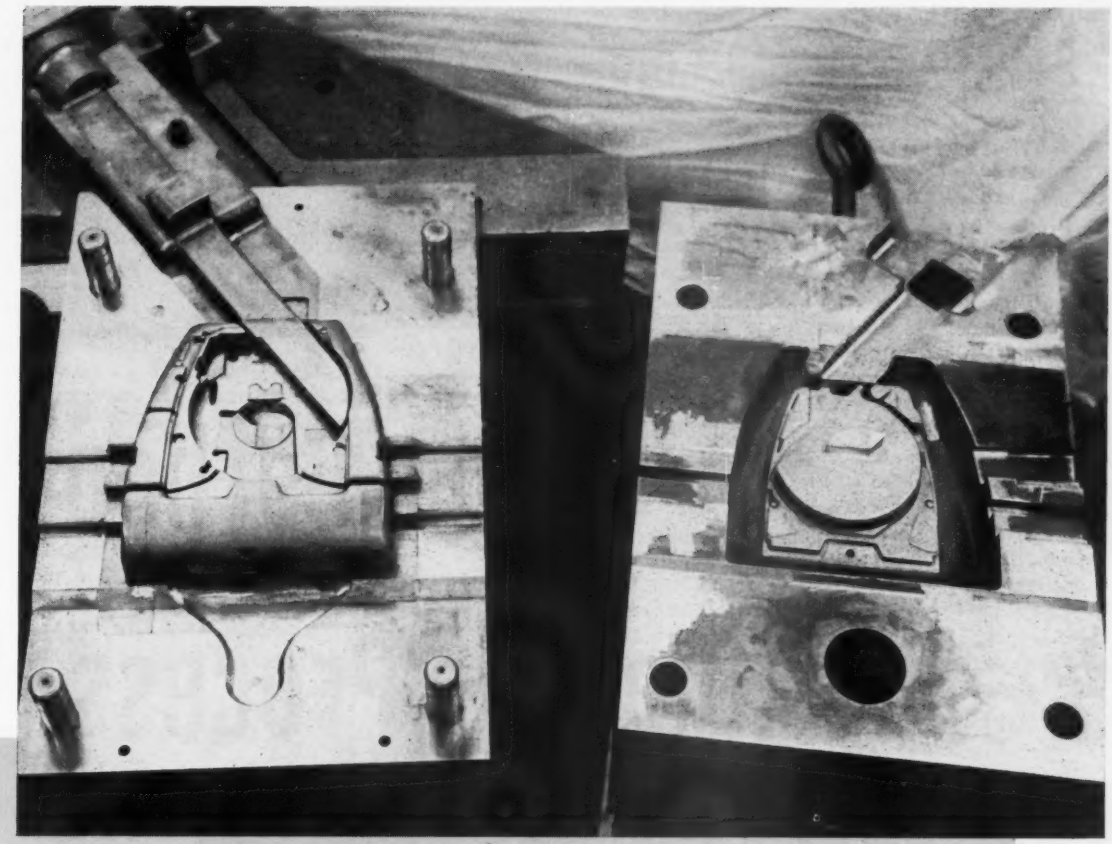
**Gating and Venting**—Deciding on gate and vent locations is probably the most important element in design of the die. To keep porosity to a minimum, adequate gating and venting are required to permit escape of entrapped air from the die cavity. Channels from 0.005 to 0.006 in. thick at the parting line or other locations usually suffice to provide this escape of air ahead of the entry of metal into the cavity.

Gates are placed following conferences with foundry, engineering and tooling personnel. Initially, gates are located as indicated by previous experience (x-ray records, research records of similar jobs, etc.). Gates initially are intentionally cut undersize. Several castings are made with initial gating and venting and studied fluoroscopically to see what actually has happened. If the gating and venting appears sound, the gates and vents are machined to final dimensions.

Control of die temperature is vital to the die casting process. To dissipate the heat released by the molten metal as it solidifies in the die cavity, passages are drilled through the die block to provide a water cooling system. These water lines should, wherever practical, be no closer than ¾ in. to the cavity or to any working parts of the die to alleviate possible thermal shock to the die that might result in cracking. Under some circumstances, it may be necessary to drill water lines closer than ¾ in., but in all situations it is the best practice to keep as much stock as possible and still provide good metal flowability and chilling characteristics.

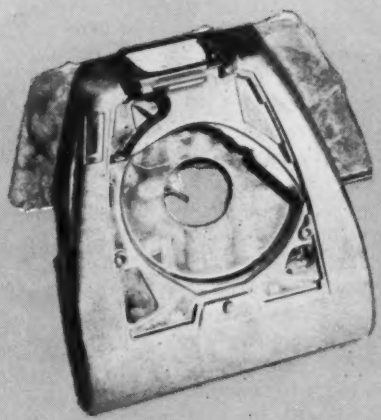
Since gently flowing metal picks up minimum amounts of air, dense die castings are promoted if the metal flowing into the cavity is nonturbulent. This condition is realized if sharp corners are eliminated and transitions from thick to thin and thin to thick sections are gradual, rather than severe.

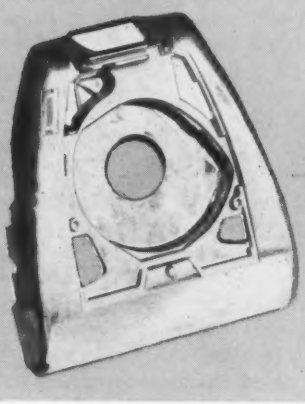
After subassembly operations, the motor, other components and the main casting become one unit

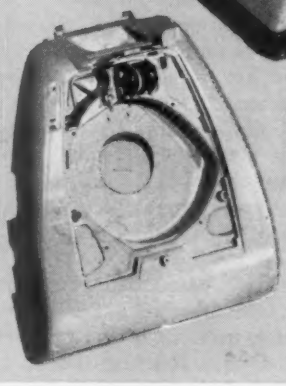


Ejector and cover halves of die for the main casting on upright vacuum cleaner. Note intricacy of detail and loose piece insert required by design of the casting

Main casting as it comes from the die, after trimming, after enameling and prior to final assembly operations, inspection, packaging and shipping







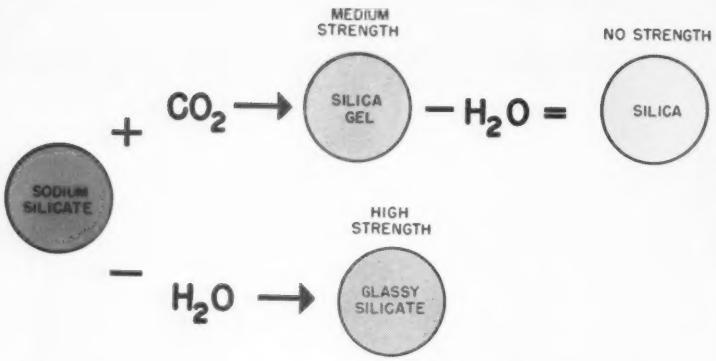



Fig. 1—Diagram shows possible reactions when sodium silicate binder is gassed with $CO_2$

***What You Should Understand About***

# The Carbon Dioxide Process

**Successful use of the carbon dioxide process requires a thorough understanding of its chemistry and the mechanism of reaction. In this article, the author explains the basic nature of the process**

By WALTER E. GRUVER JR.
Meehanite Metal Corp.
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SINCE the carbon dioxide process made its introduction in the foundry industry several years ago, its impact has been much more than a passing fancy. It has claimed more space in the foundry journals than any other subject, hailed by some as a cure-all and dismissed by others as unsatisfactory.

If one were to examine the literature on the process he would find no fewer than 18 different advantages mentioned, such as reduced molding costs, fewer casting defects, better surface finish, etc. This list of advantages is impressive, but anyone associated with the process is confronted with daily problems that have to be solved regardless of the number of advantages. Small problems are apt to be overlooked in the excitement of installing a new process, but after the excitement dies down, these small problems are likely to become big ones.

A thorough understanding of the process, its chemistry and the mechanism of reaction, is the only solution to many of the problems. It is the lack of this understanding that has hindered the growth of the process up to the present time.

**The Basic Reaction**—The carbon dioxide process is based on the reaction of sodium silicate with carbon dioxide to form a so-called silica gel. Although this is the basic reaction, it is only half of the picture (see Fig. 1).

Actually, sodium silicate may react in one of two ways. When reacted with carbon dioxide, the result is a silica gel, capable of imparting medium strength (30 to 70 pounds shear) to the sand mass. This gel is a combination of silica and water and when the gel loses its water, the silica remaining has no bonding strength.

The other possible reaction of the sodium silicate is to give off its combined water before reaction with carbon dioxide to form a solid which will be called glassy silicate. This product has very high strength (greater than 220 pounds shear). The natural question now arises: what happens when a core is gassed? This question can only be answered by knowing the amount of carbon dioxide which has reacted with the sodium silicate, because this will determine the strength of the sand

mass at any particular time after gassing.

In all commercial applications of the process there is never 100 per cent gel formed after gassing; there will be some gel and some unreacted sodium silicate. The unreacted sodium silicate, if given the opportunity, will give up its water and form glassy silicate. At the same time that the sodium silicate forms glassy silicate, the gel also gives up water and forms silica. One product adds strength to the sand mass and the other lowers it. The strength of a carbon dioxide core, any time after gassing, is the result of the relative amount of gel and glassy silicate present, or more specifically, the amount of initial gassing.

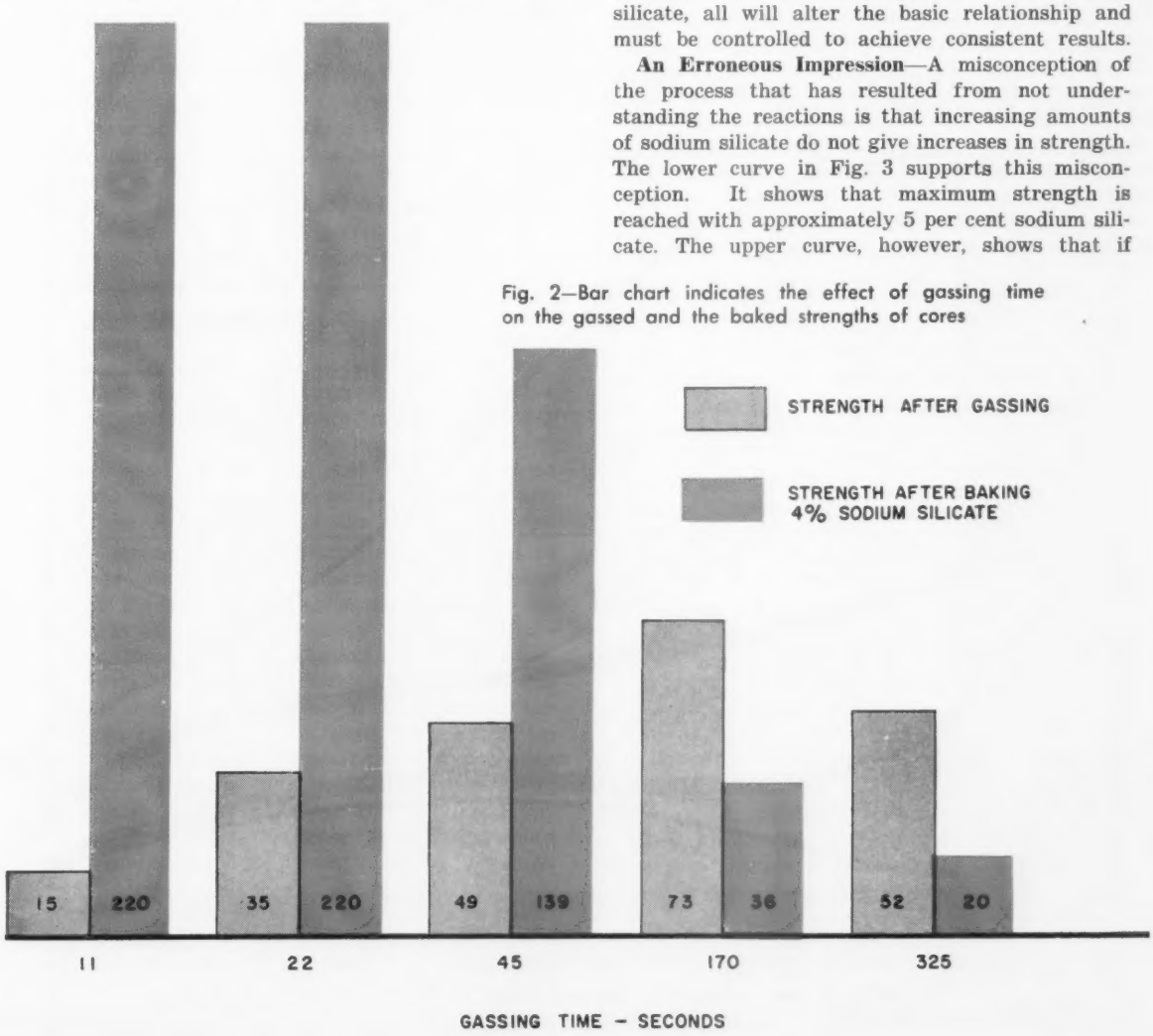
**Gassed and Baked Strengths**—The strength after gassing and the strength after baking for various gassing times are shown in Fig. 2. Notice that the general relationship is that the lower the strength after gassing, the higher the strength after baking. For example, with 11 seconds of gassing time, the strength of 15-pounds shear is obtained. This low gassed strength indicates that a large amount of unreacted sodium silicate is left to form glassy silicate during baking. This indication is confirmed after baking, where the strength is greater than 220 pounds shear. As the gassing time is increased, the gassed strength increases, due to a more complete reaction of the sodium silicate with the carbon dioxide. At the same time, the strength after baking is decreased, because there is less unreacted sodium silicate remaining to form glassy silicate.

When applied to practice, this means that the lower the strength on gassing, the greater will be the increase in strength on setting and the higher the retained strength after evaporation of water is complete. Conversely, if the initial strength is high, then there will be a relatively small increase in strength with setting, and the sand mass will begin to lose strength shortly after gassing.

All of the subsequent properties of the sand mass are dependent on the relative amounts of gel and glassy silicate present after gassing, and their relationship should be remembered as the basic one of the carbon dioxide process. As basic as this relationship is, there are a number of variables that will affect it. The amount of sodium silicate, gassing time, water present, fine material, hydroscopic materials, sand grain size and the physical and chemical properties of the sodium silicate, all will alter the basic relationship and must be controlled to achieve consistent results.

**An Erroneous Impression**—A misconception of the process that has resulted from not understanding the reactions is that increasing amounts of sodium silicate do not give increases in strength. The lower curve in Fig. 3 supports this misconception. It shows that maximum strength is reached with approximately 5 per cent sodium silicate. The upper curve, however, shows that if

Fig. 2—Bar chart indicates the effect of gassing time on the gassed and the baked strengths of cores



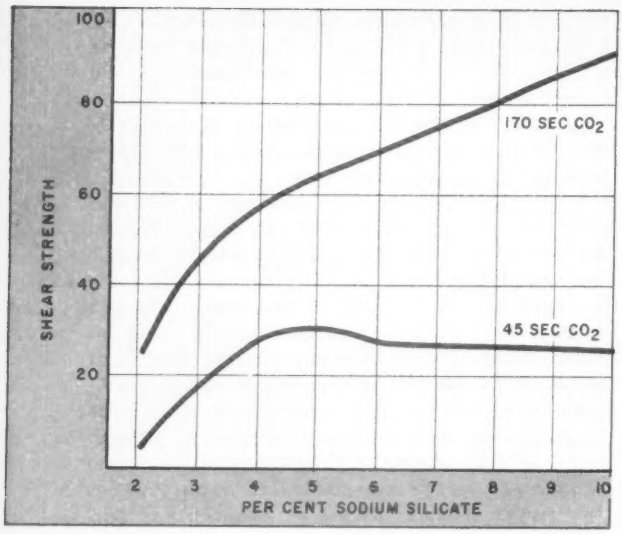


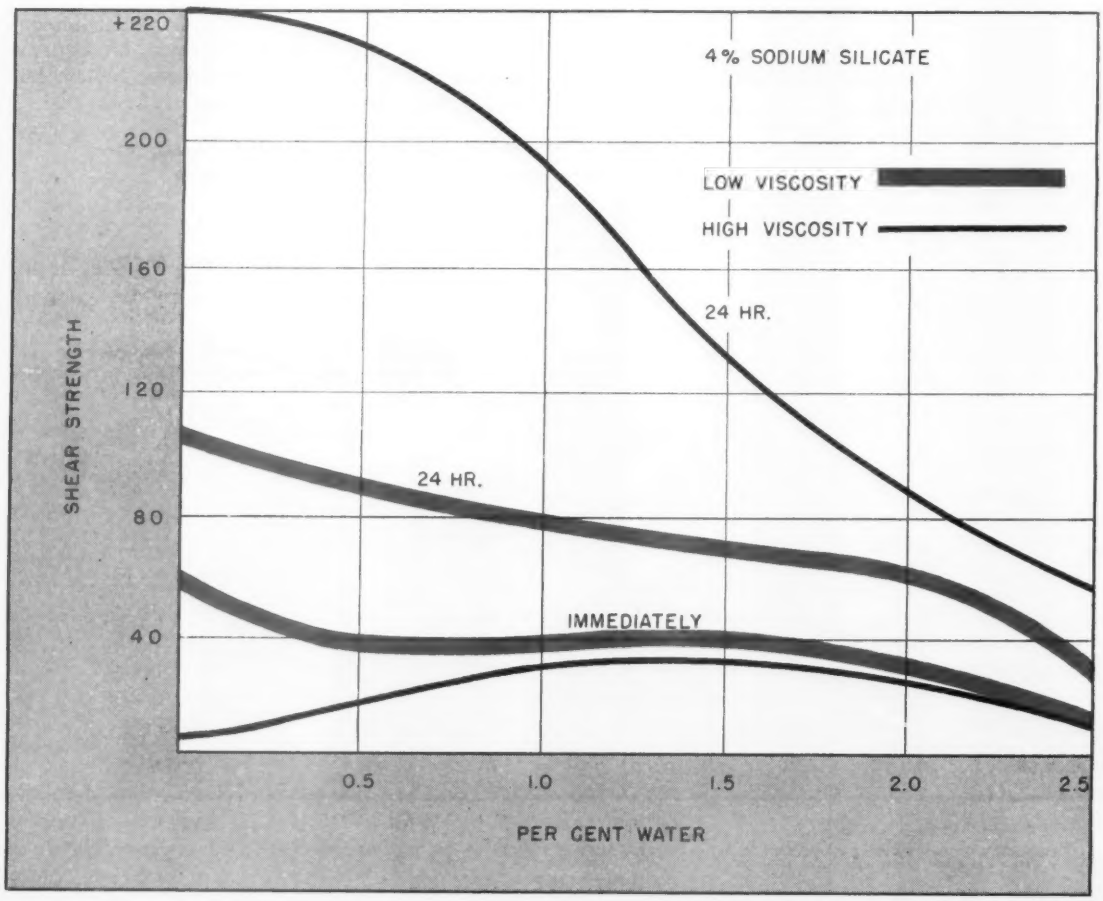

Fig. 3—Illustrating effect of gassing time on strength with varying amounts of sodium silicate

gassing time is increased, the strength rises with increasing amounts of sodium silicate. What actually has happened in the lower curve is that, with the gassing time indicated, 5 per cent sodium silicate is the maximum amount that can be gassed. By increasing the gassing time, more sodium silicate can react, resulting in higher strengths. Very high gassed strengths can be obtained, provided there is sufficient sodium silicate present and the gassing time is long enough.

**Water Causes Trouble**—The effect of water often causes disastrous effects in the foundry where water is likely to creep into the sand mix in a number of ways. The effect of water on two common grades of sodium silicate is shown in Fig. 4. In the low-viscosity silicate it decreases the gassed strength and it also decreases the strength after 24 hours.

The addition of water to the high-viscosity silicate increases the gassed strength up to an optimum water content before a decrease occurs. The effect of water is dependent on the chemical properties of the sodium silicate, i.e., the effect of water on the viscosity of the sodium silicate. As more water is added and the viscosity is decreased, the sodium silicate is more easily gassed. This change in the amount of silicate that is initially reacted is what causes the effects that follow gassing.

Fig. 4—Chart shows effect of water on strengths of high and low-viscosity silicates



**Fines Affect Strength**—Fine material, whether in the form of sand fines or in the form of additives which are in the sand mix to impart special properties, will affect the strength. With the proper mulling cycle, each particle in the sand mass is coated with an envelope of silicate. A thin envelope of silicate more readily reacts with carbon dioxide than a thick one; hence, the thickness of this envelope will affect the gassing properties of the sand mix.

More directly, the surface area of the sand mass determines the thickness of this envelope and anything that will add surface area to the sand mass (such as fines) will decrease the silicate envelope.

Fig. 5 shows the effect of the addition of increasing amounts of 270 mesh sand to sand of AFS 65 fineness. The gassed strength is gradually increased and the strength on setting is decreased, indicating more complete gassing due to a decrease in the thickness of the silicate envelope.

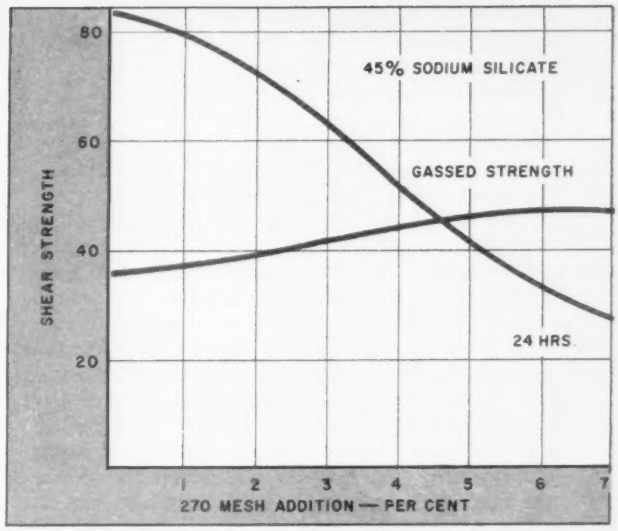



Fig. 5—Showing the effect of fines on strength

The effect of clays is two-fold. One, they add surface area to the sand mass and, therefore, act as fines, the effect of which has been discussed. Clays are so fine that 1 or 2 per cent will often cause the same adverse effect as did 7 per cent of the 270-mesh material shown in Fig. 5. Secondly, they are hygroscopic materials; that is, they have an affinity for water. The effect of the hygroscopic material is that it upsets the water balance in the silica gel. Although the exact nature of the water balance is not understood, the maintenance of the correct water balance in the gel is essential to obtaining the maximum strength properties.

The degree of adversity of the effect of hygroscopic materials will depend on how hygroscopic the individual clay is. For example, western bentonite, the most hygroscopic of the clays, will affect the strength more than a kaolin clay or a fire clay, which are far less hygroscopic.

Each sand that is used will produce different strength relationships, due to the change in surface area and thickness of the silicate envelope.

The strengths obtained with various sands of different finenesses immediately after gassing and at times up to 24 hours after gassing, are shown in Fig. 6. In the coarse sand shown, the sodium silicate, due to a thick silicate envelope, has reacted only slightly with carbon dioxide and there is a continual increase in strength over the 24 hours as glassy silicate forms. As the sand becomes finer, the shape of the curve with extremely fine sands changes until there are decreases in strength on setting. As the sand becomes finer, the silicate envelope becomes thinner and more complete gassing is accomplished. Therefore, there is less unreacted silicate, etc.

These curves would indicate that a sand of AFS 65 fineness is the best to use with the carbon dioxide process. This is not the case, because by changing the amount of sodium silicate and/or the gassing time, the curves for the other sands shown can be made to look as good as the AFS 65 sand.

When selecting a sand mix, the per cent of binder and fineness of the sand should be chosen by considering the amount of gassing expected, the length of time between gassing and pouring, and the strength required. These considerations will provide the optimum properties at the time of pouring.

Four per cent sodium silicate was used as a binder in Fig. 6. The fineness of the AFS 101 sand permitted a high reaction with carbon dioxide and, therefore, there was little unreacted silicate to form glassy silicate and maintain the strength in the sand. By increasing the sodium silicate, in this case to 7 per cent, there is enough unreacted silicate to form glassy silicate and offset the drop in strength due to the breakdown of gel. The result is a continual increase in strength, as shown in Fig. 7. The curve for any sand may be altered in a like manner.

**Mulling Time a Factor**—Mulling time is extremely important if the maximum properties are to be obtained from the sand mix. There is a definite time at which the maximum strength properties are obtained. Although this time will vary, dependent upon the individual muller and the sand mix, the shape of the curve will be very similar for all mullers. There will be an increase of strength in the initial stages of mulling until the silicate is thoroughly mixed with the sand and each grain is more or less uniformly coated. With continued mulling the silicate begins to dry and the strength decreases on gassing, because some premature hardening has taken place. Anyone who is using the carbon dioxide process should run a test in his muller with each sand mix used to determine the best mulling time.

A number of sodium silicates are commercially available, and the problem for the foundryman is to choose the best one for any particular job. Only three of the many different grades produced

are used to any extent in the carbon dioxide process. They are:

| | | | |
|---|---|---|---|
| Silicate | 1 | 2 | 3 |
| Alkali to silica ratio | 1:2 | 1:2.4 | 1:2 |
| Viscosity (poises) | 2-4 | 15-30 | 700 |
| Baume | 50 | 52 | 59 |

**Principal Properties**—The alkali : silica ratio and the viscosity are perhaps the two most important properties because they, in turn, are dependent on water content, Baume, etc., to a great degree.

Viscosities over a wide range may be used, providing the alkali : silica ratio is within the desired range. Low-viscosity silicates react faster to carbon dioxide, because there is less resistance to the passage of the gas. The higher viscosity silicates are slower gassing and, therefore, produce low gassed strength but show large increases in strength on setting or baking. The high-viscosity silicates are usually diluted with water to increase the rate of the gassing reaction, but then the increases in strength that occur on setting are not as great.

The silicates, as listed in the accompanying table, usually have definite uses in their foundry applications, due to the specific properties they impart to the sand mass. Silicate No. 1 produces a very flowable and readily gassed sand. It is best used for coremaking, particularly core blowing and ordinary coremaking where the cores are gassed in the boxes. Of the straight sodium silicates, No. 1 has the best shakeout characteristics.

Silicate No. 2 is the most universally used silicate, because it provides the best compromise between the other silicates. A sand bonded with this silicate has good reactivity with carbon dioxide, high gassed strength, some green strength and fairly good flowability.

Silicate No. 3 is the most economical, because as little as 3 per cent may be used. Its reaction with carbon dioxide is very slow, due to its high viscosity, but this viscosity supplies some green strength to the sand. This silicate is usually diluted with 1 to 1.5 per cent water to increase its reaction rate with carbon dioxide. The high viscosity has the added disadvantages of being difficult to measure and also may cause it to ball up if mulled too long. Sodium silicate No. 3 is seldom used for cores, because collapsibility of such cores usually is poor.

Commercial binders on the market consist of one of these silicates (usually No. 2) plus one or more additives to impart special properties to the sand. Although many additives are used, those that appear most useful are the various carbonaceous materials of which inverted sugars are perhaps the most popular. The function of the sugar is to supply both a carbonaceous material to the sand and also add strength. Inverted sugars supply bonding strength themselves, which offsets the loss in strength that frequently occurs with straight sodium silicate and excessive gassing.

The main function of most additives is to give the foundryman more leeway regarding the amount of binder and the gassing time. Other additives will aid things such as casting surface finish.

Regardless of the sodium silicate or the additives used, the understanding of the basic relationship between the silicate and the carbon dioxide is the first step toward complete success with the carbon dioxide process. Additionally, the effects of various conditions and properties on this relationship must be appreciated. Remember that there is no clear-cut procedure for any sand practice, and the carbon dioxide process is no exception.

This paper was presented at the East Coast Regional Foundry Conference, held April 12-13 in Philadelphia.

Fig. 6—Effect of sand fineness on strength immediately after gassing and up to 24 hours later

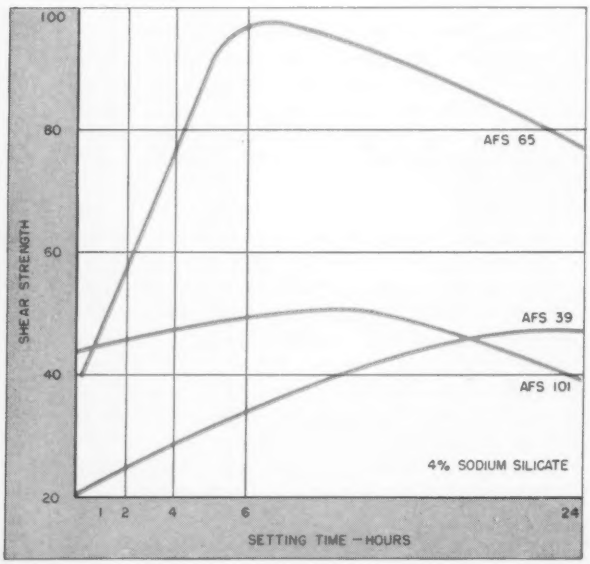
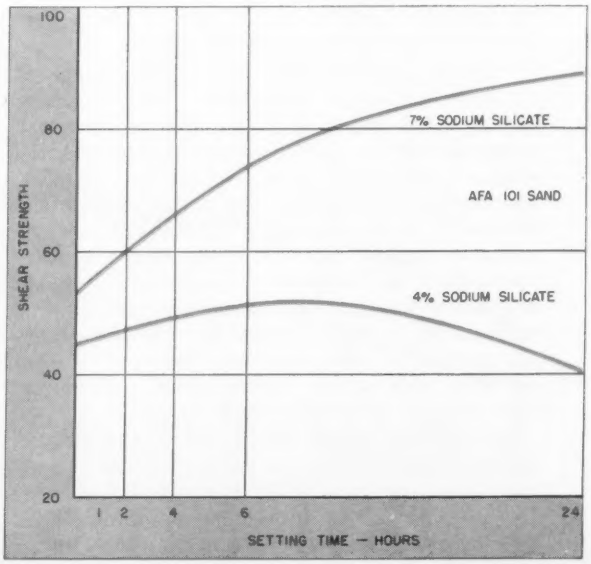



Fig. 7—Showing the effect of the percentage of sodium silicate on strength of a particular sand



# Cost Control in

# THE BRASS FOUNDRY

**In the 23rd article in his series on *The Brass Foundry*, Mr. St. John treats the control and reduction of costs in a foundry as they are related to the finished product**

By HARRY ST. JOHN
*Foundry Consultant*

COSTS can be measured and tabulated in the front office, but only in the foundry itself can they really be controlled. The man who bosses the working force and signs the requisitions is the man whose skill and judgment govern foundry costs.

In a previous article in this series, the allocation of overhead was discussed. This matter is of greater interest to management than to the foundry supervisor, but the latter is in a better position than anyone else to control many overhead items. To accomplish this control, however, he needs help from the front office—help in the form of information he cannot readily get for himself. Many a foundryman labors in the dark because nobody tells him what the score is.

For daily man-hour control, the foundryman can help himself by keeping a few essential records. Each supervisor in the foundry group should tabulate daily the number of men under his direction and the number of hours spent by each on every job to which he is assigned. When these figures are assembled, they constitute a record of the day's work showing how many man-hours were spent on direct labor and on various kinds of indirect labor. When this is compared with a standard or with an average based on past experience, one has a detailed appraisal of the day's performance.

**Select the proper Basis**—First of all, however, one must decide on a basis for comparison. In the foundry proper, the basis which gives the most informative and consistent result is the weight of metal handled as expressed in terms of tonnage melted. What we are after here is a figure which will express labor performance as a separate item uncomplicated by other factors.

For example, if we use the weight of good castings as a basis, the result will be distorted by changes in the percentage of scrap. If, to avoid this distortion, we use gross castings, the issue still is confused by variations in the casting yield, variations which have nothing whatever to do with our efficiency in the use of labor. Furthermore, since the weight of castings is not determined until they have been processed in the cleaning room, variations in cleaning-room performance would be improperly reflected in the foundry figures. Melt figures are—or should be—available at the end of each day, and there need be no delay in applying them to the work for the day.

Fig. 1 illustrates a typical set of performance data compared with previously established standard data. The last column at the right gives the performance of each foundry unit. In the examples chosen, performance falls short of standard in each case. Let us see why.

The standard is set for 12½ lb of metal melted per mold and a daily production of 200 molds per molder.

Considering the first shift on the 15th, we see that the molder hours per ton are better than standard but it is apparent at once that this result is due to a discrepancy between metal melted and molds made. The former is more than standard, the latter less. The metal per mold is 13.3 lb instead of 12.5. This variation could be due to jobs requiring more than the usual amount of metal, but the second shift, running the same jobs, used only 12.9 lb of metal per mold.

Two conclusions can be reached. Although as a rule the molders were making more than the standard number of molds, on this particular shift,

**PERFORMANCE DATA**

| SECTION | TONS MELT | MOLDS | NUMBER OF MEN | | | | | | MAN-HOURS PER TON | | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | MOLDERS | MELTERS | POURERS | DUMPERS | MISC. | TOTAL | MOLD. | MELT. | POUR. | DUMP. | MISC. | TOTAL | |
| STANDARD | 10 | 1600 | 8 | 2 | 4 | 4 | 2 | 20 | 6.4 | 1.6 | 3.2 | 3.2 | 1.6 | 16.0 | |
| DATE: 4-15-57 | | | | | | | | | | | | | | | |
| 1st SHIFT | 10.5 | 1580 | 8 | 2 | 4 | 4 | 3 | 21 | 6.1 | 1.5 | 3.1 | 3.1 | 2.3 | 16.1 | |
| 2nd SHIFT | 7.8 | 1206 | 6 | 2 | 4 | 3 | 2 | 17 | 6.2 | 2.1 | 4.1 | 3.1 | 2.1 | 17.4 | |
| DATE: 4-16-57 | | | | | | | | | | | | | | | |
| 1st SHIFT | 9.3 | 1440 | 7 | 2 | 4 | 4 | 2 | 19 | 6.2 | 1.8 | 3.5 | 3.5 | 1.8 | 16.8 | |
| 2nd SHIFT | 5.2 | 810 | 4 | 1 | 2 | 2 | 2 | 11 | 6.2 | 1.5 | 3.1 | 3.1 | 3.1 | 16.9 | |

How comparison of a typical set of performance data with previously established standard data can help in daily man-hour control

there was a shortage. Also, as compared with the second shift, there was a waste of metal, possibly because of careless pouring or pouring too much metal into pigs. It's a good idea to weigh the pigs each day to control this particular loss.

The second shift on the 15th did well, except that it was operating at an uneconomical level. Six molders required as many melters and pourers as if there had been eight. The use of four molders would have permitted a reduction in this processing labor. If one of the six molders had been absent, the results would have been even worse. If eight molders are not needed, the economical thing to do is to schedule four molders with one extra man in the miscellaneous classification to substitute for a possible absentee in any of the other classifications. This step was taken on the 16th. Of course, if one is so fortunate as not to have absenteeism except on rare occasions, the extra man would be an extravagance. The effect of an absentee molder on an otherwise good record is shown in the performance of the first shift on the 16th.

These examples have been chosen to illustrate how closely one can pinpoint variations in manpower. In practice, much wider variations are likely to be observed, often for reasons which cannot be controlled easily.

**Tonnage Applies Elsewhere**—Similar tabulations, differing in the labor classifications, should be prepared for cleaning room and coreroom. Contrary to what one might suppose, the daily tonnage melted again is the most useful basis for measuring labor performance, even though these departments are not exactly in step with the foundry proper.

It may well be argued that in the cleaning room, labor should be proportional to the gross weight of castings handled. If this weight could be measured day by day, the argument would be valid. But castings in the cleaning room go through several steps, commonly over a period of more than one day, and usually are not weighed until the cleaning room is through with them. This practice introduces a variable which interferes with consistent performance figures. As a matter of experience, it has been found that the level of the foundry operation as a whole is best measured by the weight of melt and that everything else can be geared to it.

A possible lag in cleaning room operations must be taken into consideration. If the man-hours per ton are low it may be due, not to high efficiency, but to the fact that the cleaning room is falling behind. This lag can be detected by noting the daily gross casting percentage. If the ratio of casting weight to melt is abnormally low and trending downward, the indication is that partially finished castings are accumulating in the cleaning room. Eventually this trend would become evident to the eye, but it can be learned more quickly from the labor performance data.

In the coreroom, exactly the opposite situation exists. If the coreroom lags behind the foundry, the shortage of cores is evident immediately. But the coreroom can get ahead of the foundry, and unneeded cores can accumulate. Perhaps the best way to detect this condition promptly is by the use of core tickets. If a ticket is made out for each batch of cores when the coreroom receives the order, and it progresses step by step as the cores are processed, any unusual accumulation of finished or partly finished cores becomes readily apparent.

It is difficult to arrive at a logical basis for man-hour performance in the coreroom. It might be expected that the weight of sand used would be

a good basis, but it doesn't work out that way unless the coreroom works consistently on cores of about the same size and character. Some light cores require much labor, whereas others of twice the weight need little. Although tons of metal melted seems an illogical basis for coreroom performance, that figure gives the most useful results—this in spite of the fact that some of the castings, being solid, require no cores and that the proportion of solid castings varies from time to time.

**Other Cost Items**—The daily reports so far described give the foundryman a good idea of his labor performance and enable him to correct discrepancies as soon as they occur. But he needs something more, and here the accountant must help him. Fig. 2. illustrates a monthly report to guide the foundryman in his task of controlling and reducing costs as these are related to the finished product. The items listed in the table tell the foundryman what he needs to know, but they can be rearranged or amplified to suit the circumstances that are peculiar to the individual foundry.

For large operations there should be a further breakdown of the supply items. The cost of metal is not included because it is beyond the control of the man directly responsible for foundry operation, except, of course, where he also is the proprietor. It will be noted that the foundryman's own records will supply most of the information included in the upper part of the form, but the "dollars per cwt" figures will have to come from the accountant.

One important point often is overlooked. The foundry needs "cost-conscious" men in every rank of supervision. If these men are permitted to see day by day and month by month what their performance is and how it progresses, they will take an interest which otherwise could not be expected of them. The importance of this point as a morale builder hardly can be overestimated.

Monthly report shown below is compiled with help of accountant and guides the foundryman in his task of controlling and reducing costs

| MONTHLY PERFORMANCE REPORT APRIL 1957 | APRIL 1957 | AVERAGE 1957 TO DATE | AVERAGE YEAR 1956 |
|---|---|---|---|
| TOTAL MELT IN TONS | | | |
| GROSS CASTINGS IN TONS | | | |
| GROSS CASTING YIELD, PER CENT | | | |
| TOTAL SCRAP, PER CENT OF GROSS CASTINGS | | | |
| NET GOOD CASTINGS IN CWT. | | | |
| MAN-HOURS PER TON MELT, FOUNDRY | | | |
| MAN-HOURS PER TON MELT, COREROOM | | | |
| MAN-HOURS PER TON MELT, CLEANING ROOM | | | |
| MAN-HOURS PER TON MELT, TOTAL | | | |
| **DOLLARS PER CWT. NET GOOD CASTINGS** | | | |
| FOUNDRY LABOR, TOTAL | | | |
| FOUNDRY, FUEL AND SUPPLIES | | | |
| CLEANING ROOM LABOR, TOTAL | | | |
| CLEANING ROOM SUPPLIES | | | |
| COREROOM LABOR, TOTAL | | | |
| COREROOM SUPPLIES | | | |
| TOTAL FOUNDRY COST | | | |
| TOTAL CLEANING ROOM COST | | | |
| TOTAL COREROOM COST | | | |
| TOTAL OVER-ALL COST | | | |

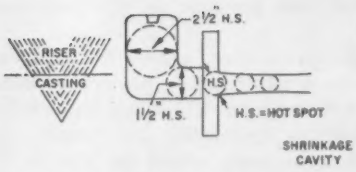



Fig. 1—Left, ideal design for directional solidification. At right, practical use of the design shows casting section size increasing toward the riser

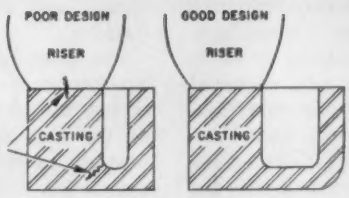



Fig. 2—Small cored pocket will create hot spot and shrinkage. Big pocket aids proper feeding

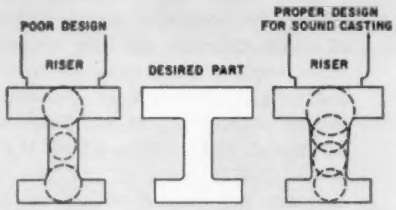



Fig. 3—Bottom circle in poor design shows shrink area. Good design has tapered midsection

## *How To Design for Sound . . .*

# Stainless Steel Castings

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IN RECENT years top management has placed increased emphasis on the value of co-operative efforts between the designer and supplier of castings. Failure to meet fundamental design requirements is responsible for many defective castings. Although the skilled foundryman often may furnish sound and serviceable castings from poor designs, the job always will be done at a higher price and with less casting uniformity.

The ideal casting is one in which all sections can be fed properly by liquid metal. The design is such that larger sections of the casting are fed directly from the riser which receives the last hot metal to enter the mold.

Because of the nature of the alloys and high pouring temperatures employed, severe liquid contraction occurs when stainless steel solidifies. Thus, large risers are required, and casting designs should employ sections gradually enlarged to the riser. Such a design will eliminate hot spots of liquid metal which may be closed off by solidifying metal in adjoining sections, resulting in shrinkage defects. This design produces progressive solidification and requires a V-type feed: The casting begins at the root of the V and the riser is at the top. Figs. 1, 2 and 3 illustrate these basic concepts.

Designing for stainless steel probably is more important than for any other class of steel due to the extreme corrosive or high-temperature service life required. Because of heavy oxide films, stainless steels are sluggish in the fluid state. For small castings a minimum of ¼-in. metal section is required to insure good running of the casting to eliminate or minimize misrun to coldshut defects (Fig. 4).

**Section Uniformity Is Good**—Designing for uniform metal sections is desirable. Uniformity minimizes hot spots which are responsible for poor temperature gradients, uneven contractions, shrinkage cavities in inaccessible locations, residual stresses and often hot tears. Table I shows proper feeding distance from the edge of the riser in uniformly thick sections.

A riser can feed a vertical section a slightly greater distance than it can a horizontal section of the same thickness. A 10-degree taper will insure x-ray soundness on any section up to 2 in.

Gradual tapering of sections is extremely important where cracking or hot tearing is likely to occur (See Figs. 5, 6, 7 and 8). The nature of high alloys and the high pouring temperatures required for stainless steels make them very weak just before the solidus state. Consequently, hot-tearing will be minimized if abrupt changes in metal sections are eliminated.

Another defect is a shrinkage crack caused by too sharp a fillet or radius in corners (Fig. 9). Too small a radius will cause an uneven cooling rate, resulting in weakness or shrinkage which

**TABLE 1—Feeding Distance from Edge of Riser in Uniformly Thick Sections[1]**

| Section Design* | Feeding Distance In terms of Casting Thickness (T) Commercial Castings (Class 2 ASTM E-71) | Perfect Castings (Radiographically Sound) |
|---|---|---|
| Plates | | |
| ½ inch and less, thick | 12T | 8T |
| 1 and 2 inch thick | 6T | 4.5T |
| Rectangular Bar Section‡ | | |
| 1 inch thick | 7T | — |
| 2 inch thick | 6T | — |
| 4 inch thick | 5T | — |
| Square Bar Sections | | |
| 1 to 4 inches thick | 4.5T | 6√T |
| 6 and 8 inches thick | — | 6√T |

*(Width is equal to or greater than 3 times the thickness)
‡(Width is less than three times the thickness and greater than the thickness)
°(Width is equal to the thickness)
[1]Data compiled by William S. Pellini, Naval Research Laboratory

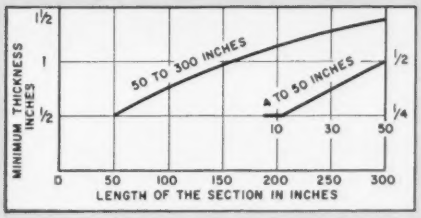



Fig. 4—Minimum section thickness related to section length of well-designed casting

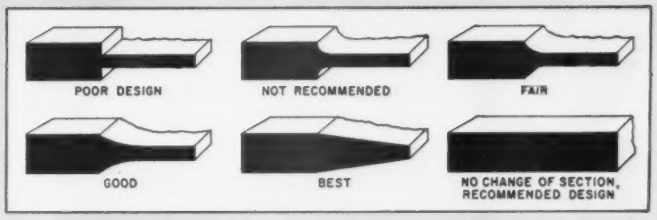



Fig. 5—Gradual tapering of sections helps in minimizing cracking or hot tearing of stainless steel

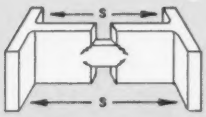



Fig. 6—Wiggly lines show hot tearing due to stress concentration at junction of big and little sections

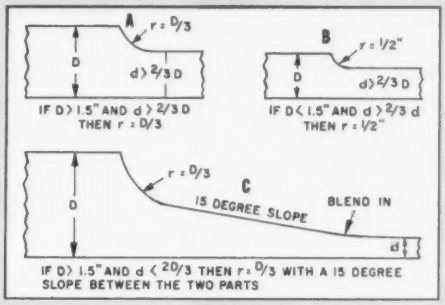

A
r = D/3
D
d > 2/3 D
IF D > 1.5" AND d > 2/3 D THEN r = D/3
B
r = ½"
D
d > 2/3 D
IF D < 1.5" AND d > 2/3 d THEN r = ½"
r = D/3
C
D
15 DEGREE SLOPE
BLEND IN
d
IF D > 1.5" AND d < 20/3 THEN r = D/3 WITH A 15 DEGREE SLOPE BETWEEN THE TWO PARTS

Fig. 7—Recommended radii to be used where section changes are on one side

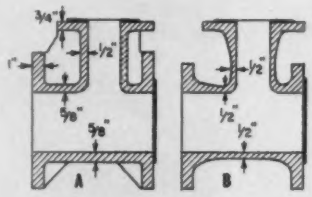



Fig. 8—Blended sections of design B reduce possibility of stresses and hot tears that may occur in design A

should be referred to as a shrink crack. Recommended fillets or radii are given in Fig. 10. Smaller radii than shown will cause uneven cooling and larger radii will cause extreme shrinkage due to the volume increase.

Internal porosity caused by core gas is another plague for foundrymen. This defect can be minimized by designing cored areas so that gas in the metal and core gas can be eliminated from the cope side of the mold. Another problem is the proper anchoring of cores. Often there is a tremendous upward pressure on cores with no means of holding them down.

This results in core blows and uneven metal sections. In many cases the end use of the casting may preclude the use of chaplets. In such cases foundrymen would appreciate additional cored outlets whether at the parting or on the cope side. These would help to anchor the core and to eliminate core gas (Fig. 11).

Deep pockets should be minimized or eliminated since they cause uneven cooling rates, resulting in shrinkage. Also, erosion caused by metal hitting the mold section forming the deep pocket results in dirty castings (Fig. 12).

**Design of Joining Sections**—Sections may be joined in only five ways. These may be exemplified by the following letters of the alphabet: L, T, V, X and Y. All other modes of connection are modifications of these. Fig. 13 illustrates good and bad casting design for the L, V and Y. Fig. 14 illustrates the effect of mass.

The L section is preferred. However, the larger the radius of the L section, while maintaining an even metal section, the better (Figs. 15 and 16).

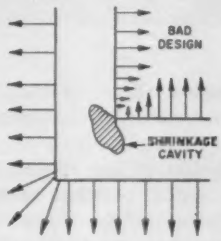



Fig. 9—Shrink at corner caused by uneven cooling shown by arrows

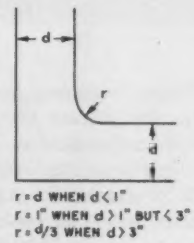



Fig. 10—Suggested radii to use for avoiding defects due to shrinkage

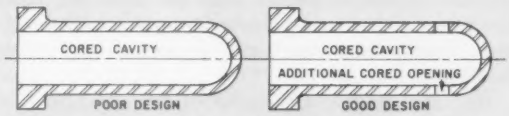



Fig. 11—Use of core prints as shown at right holds core in position and provides means for gas to escape, avoiding blows in the casting

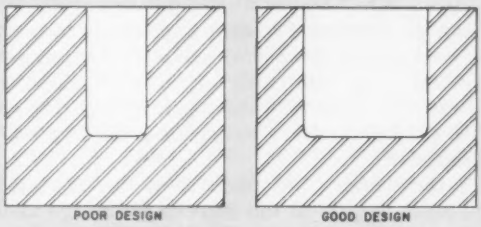



Fig. 12—Width of pockets formed by green sand usually should be no greater than their depth

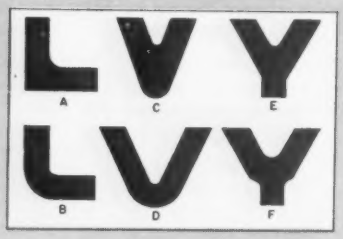



Fig. 13—Design forms B, D and F are good. Section at junctions in B and D is thinner than the arms

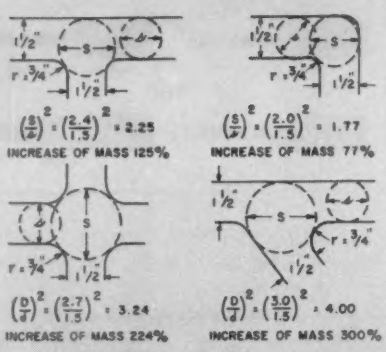



Fig. 14—Circle size shows mass effect

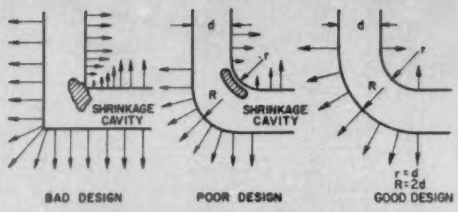



Fig. 15—Evolution of the L design

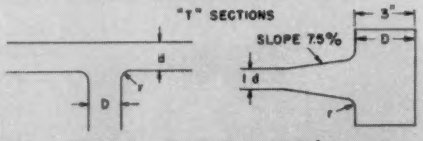



Fig. 17—Left, if D is <1.5d; r=D. If D is >1.5d; r=D with a 7.5% slope to fit the radius as shown at right

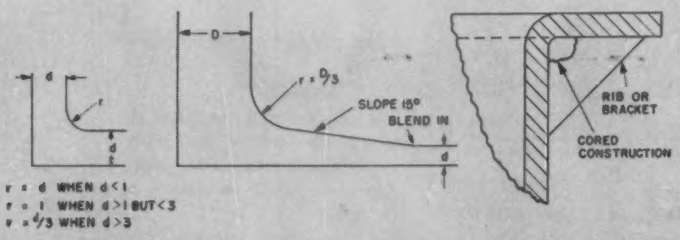



Fig. 16—L design with exterior corners. Proper blending of unequal sections shown in center. Right, cored rib construction

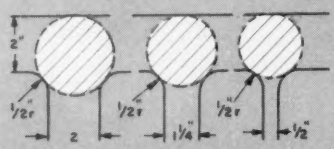


Fig. 18—Tie-in member in T sections should be small as possible to diminish hot spot to a minimum

When designing a T section (Figs. 17 and 18) care also should be taken to maintain as even a section as possible.

When designing an X section (Figs. 19 and 20) it is preferable to core it out if possible. Sometimes, the X is broken down to two T sections, but utmost care should be taken not to have the sections too close together which might result in cracking between the sections, especially in high-temperature service. When designing for any of the straight chromium alloys, even more care in eliminating large section changes must be practiced, since these alloys are prone to stress cracking. Design hints for V and Y sections are shown in Figs. 21 and 22.

Another plague, especially to the machinist, is shifting of castings. Wherever possible, the parting line should be located where it will least affect the jigging or chucking of the casting if slight shifts do exist.

**How to Achieve Pressure Tightness**—Last, but not least, is the problem of making a casting pressure tight. In nine cases out of ten, leakers can be traced to internal shrinkage. One of the best cures for leakers is to design for good progressive solidification.

In the design of stainless steel castings attention must be paid to the extreme shrinkage allowances, as compared with the relatively low allowances for cast iron and nonferrous metals. Tables II and III explain recommended allowances. Obviously because of shrinkage differences, satisfactory results are difficult to obtain when the same pattern is used for iron and for stainless steel.

Although the various tolerance ranges are shown, results are best if the average is used. In no case should a value below the minimum be used. The precise tolerance may be applied by foundrymen who have had previous experience in making the casting. Another important point is that the tolerance may vary with the type of hindered contraction.

A further consideration involves allowances for machining. Table IV gives recommended allowances.

The nature of the part and its service has a definite effect on the allowance for machining. For

**TABLE II—Shrinkage Contraction Allowances**

| Metals | Shrinkage Allowances Per Foot |
|---|---|
| Aluminum | 3/16" |
| Cast Iron | 1/10" |
| Brass | 3/16" |
| Carbon Steel | 1/4" |
| 12.0% Cr Steels | 1/4" |
| 18% Cr–8% Ni Steel | 5/16" |
| 25% Cr–12% Ni Steel | 9/32" |
| 28% Cr Steel | 1/4" |
| 15% Cr–35% Ni Steel | 5/16" |
| Pure Nickel | 1/4" |
| Monel | 1/4" |

**TABLE III—Dimensional Tolerances for Steel Castings That Are Not to Be Machined**

| Tolerance | <12" | 12-36" | 36-120" |
|---|---|---|---|
| Average | .06+.006D 1/16" min. | .06+.006D | .08+.006D |
| Concise | .04+.005D 1/16" min. | .05+.005D | .07+.005D |
| Minimum | .03+.004D 1/16" min. | .04+.004D | .06+.004D |

Where D=longest dimension of the casting in inches.

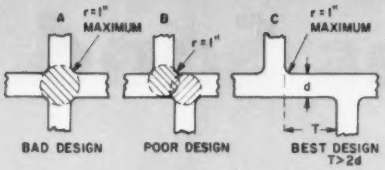



Fig. 1—Suggested X design to reduce shrinks and tears

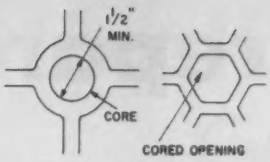



Fig. 20—Changing X design to Y reduces mass

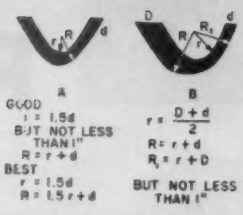



Fig. 21—V designs for even and uneven metal sections

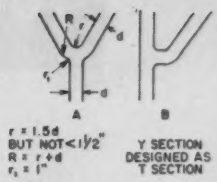



Fig. 22—Suggested designs for parts with Y sections

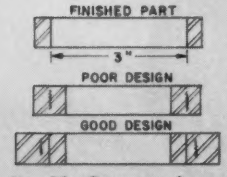
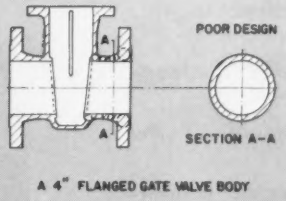



Fig. 23—Suggested way of adding finish stock



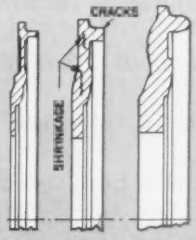




Fig. 26—Sealing plate defects were eliminated with contoured design

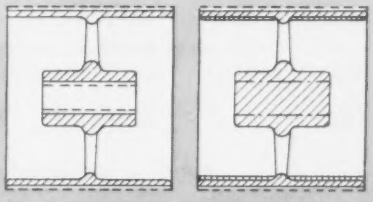


Fig. 27—Making pulley bore solid and adding metal to back of the rim eliminated shrinkage defects

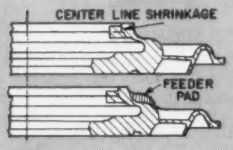



Fig. 24—Adding feeder pad eliminated shrink obtained in top design

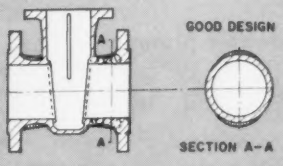



Fig. 25—A flanged gate valve leaked behind seat intersections. Padding the T section of the seat and body behind the flange eliminated the leakage

example, in Fig. 23 the finished part is approximately 3 in. ID with ⅛-in. wall after machining. According to Table IV a machining tolerance of ⅛-in. should be provided. Previously it was stated that a ¼-in. wall thickness is the minimum that should be poured. After machining the ⅛-in. per side, however, there would be a chance of running into center line shrinkage which to the average eye would appear as a bore crack or a shrinkage crack. The obvious answer is to cut down on the finish, but in this case the minimum tolerance was used. Therefore, it would be best to lag the back side of the pattern to throw the shrinkage off center.

**Typical Solutions to Problems**—Here are some practical results achieved as a result of excellent co-operation between designer and foundryman:

1. Shrinkage in lugs of a supercharger diaphragm. This was the case of an isolated hot-spot which resulted in internal shrinkage and high salvage cost. Simple padding to insure progressive solidification eliminated the defect (Fig. 24).

2. A 4-in. flanged gate valve originally leaked behind the seat intersections. Padding from the back of the flange directly to the T section of the seat and body wall eliminated leakers resulting from T section shrinkage (Fig. 25).

3. A sealing plate was plagued with cracks on outer ribbed area and small shrinkage areas throughout due to uneven metal sections and poor temperature gradients set up by attempting a static pour. Corrections were made by rounding corners on outer ribbed area to eliminate cracks. Shrinkage areas were eliminated by gradually tapering the metal section for progressive solidification. It also was found that a denser cast structure was achieved by centrifugal casting rather than static casting (Fig. 26).

4. Shrinkage cracks occurred on the outside diameter of the rim and in the bore of the hub on a pulley casting. The machining allowance on the outside diameter, although normal, resulted in machining into the center line of casting. The trouble was corrected by lagging the back of the rim the amount that is machined off the outside diameter to move the center line of the casting farther away from the finished surface. The bore originally was cored out, so the correction would be to cast it solid to allow proper feeding of casting. The bore, then, is machined out (Fig. 27).

**TABLE IV—A Guide to Machine Finish Tolerance**

| Casting Diameter, Inches | Circular Shaped Castings—O.D. Finish |
|---|---|
| Up to 4" | 1/8"+per side |
| 4" to 12" | 3/16"+per side |
| 12" to 24" | 1/4"+per side |
| 24" to 60" | 3/8"+per side |
| 60" to 108" | 1/2"+per side |
| **Bores** | |
| Bore Diameter, Inches | Machine Allowance on Bore Radius, Inches |
| Up to 1" | Cast Solid |
| 1" to 3" | 1/8" finish |
| 3" to 6" | 3/16" |
| 6" to 16" | 1/4" |
| 16" to 24" | 3/8" |

**ACKNOWLEDGMENT**

Many of the diagrams used in this article are taken from the *Steel Castings Handbook* published by Steel Founders' Society of America.

# SWEDISH FOUNDRY Prepares Sand

**Fully automatic operation is accomplished in this new sand preparation plant at one of Sweden's leading gray iron foundries. Moisture content of the sand is adjusted on the basis of dielectric properties of the sand measured between condenser plates**

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FOUNDRY technicians for some time have considered methods of automating the various steps of the founding process. One operation well suited for automation is sand preparation.

Some years ago we had reasons to study this problem thoroughly at Norrahammar because the sand preparation plant in our central-heating boiler foundry had to be replaced. Our new sand preparation plant was completed in August, 1955, and is designed to furnish sand with good properties at the lowest possible cost.

The unit was planned to meet these requirements:

1. It should be contained in the existing foundry premises.
2. It should be free from dust, and its construction should eliminate accidents.
3. It should be automatic and safe and operate at minimum cost.
4. The unit should eliminate the hot sand problem.
5. It should be designed to guarantee homogeneity of the sand.

Fig. 1 is a schematic view of the unit. To house the sand preparation plant in the existing foundry premises, we made it low, independent of the building, and compact (Figs. 1-3). This design made all movement of sand and binders within the unit quite short, and we did not have to construct a separate building.

**Mixers**—The sand preparation unit eventually will consist of three separate mixing stations. Two already are built, with a total capacity of 40 tons of sand per hour. Each consists of the following: A 1600-cu-ft return sand hopper; a 230-cu-ft new sand hopper; a 53-cu-ft bentonite hopper; a 53-cu-ft seacoal hopper; a balance with measuring vessels; a roll mixer; an automatic control device for the mixer; and an automatic control device for the determination of moisture content.

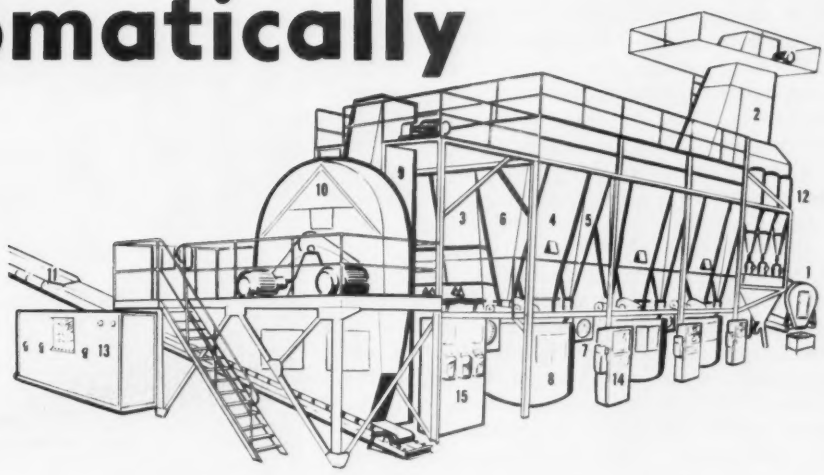
The sand is mixed automatically in the following fashion. During mixing of one charge, the next is prepared with a belt conveyor, which feeds a quantity of sand, fixed by the balance, into the measuring vessel. During this feeding, the moisture of the sand is measured automatically, and new sand, also weighed, is fed in. The automatic control device for moisture content registers the moisture, and the difference between the percentage of water present and the desired percentage is determined. The water which must be added is led to a hopper above the mixer.

As soon as the batch of sand in preparation has been poured out of the mixer, the balance vessel is opened, and return sand and new sand fall into the mixer. Next, seacoal and bentonite are added by small roll feeders under each hopper. These feeders are time-set to add the proper quantity. Then the bottom valve of the water hopper is opened, and the already determined quantity of water is added.

Mixing is adjusted automatically by a timing roller. This arrangement facilitates easy adjustment of the time intervals. At the moment, total cycle time is three minutes, but it can be adjusted to a minimum cycle of two minutes and five seconds.

**Moisture Adjustment**—Our principal obstacle to a fully automated sand preparation plant had been the automatic determination of the moisture present in return sand and the addition of the proper quantity of water. In the type of work done at our foundry, the sand is very much dried out. In addition, the shakeout is intermittent, and the percentage of water in the return sand therefore varies within wide limits. This situation makes automatic determination of the moisture still more difficult.

# Automatically




1. Revolving screen
2. Return sand elevator
3. Return sand hopper
4. New sand hopper
5. Bentonite hopper
6. Seacoal hopper
7. Scale
8. Sand mixer
9. Prepared sand elevator
10. Aerator
11. Belt conveyor
12. Ventilation cyclones
13. Central control unit
14. Sand mixer control
15. Sand moisture cont ol

Fig. 1—Principal features of the sand preparation and handling unit

In the last few years, Americans have worked considerably on these problems, and we decided to ascertain how far they had got. The system used in the United States is based on the resistance principle, and the sand is regarded as an electrolyte. The ion concentration of the sand varies with its percentage of clay, and, accordingly, the method presupposes that the return sand has a constant percentage of clay. All installations in America that we studied obtained satisfactory results, but the percentage of water in the sand varied within relatively wide limits. We did not find their method applicable to a solution of our problem. We came into contact, however, with a German firm which for many years has specialized in building equipment for moisture determination, principally for the cellulose industry. This firm had had no former contact with foundries, but it succeeded in solving our problem.

The method we now are using is based on capacity measuring. The apparatus consists of a generator for high-frequency current of 2 megaherz, with a rectifier, an amplifier and a measuring condenser. The condenser plates are placed so that the sand from the return sand hoppers passes there on its way to the measuring vessel (Fig. 4). The capacity of the condenser is dependent on the dielectric constant of the sand passing between the condenser plates and on the distance between the plates.

The dielectric constant of water is 80, and that of sand and clay is 2-3. If a constant sand height is kept, the capacity of the condenser varies with the moisture content of the return sand. Every change in this percentage results in an altered frequency for the high-frequency current, which is transferred to the rectifying part of the regulator. It is rectified, amplified and indicated on the instrument for moisture indication.

The measuring values are passed on to the integral regulator and there are intensified fur-

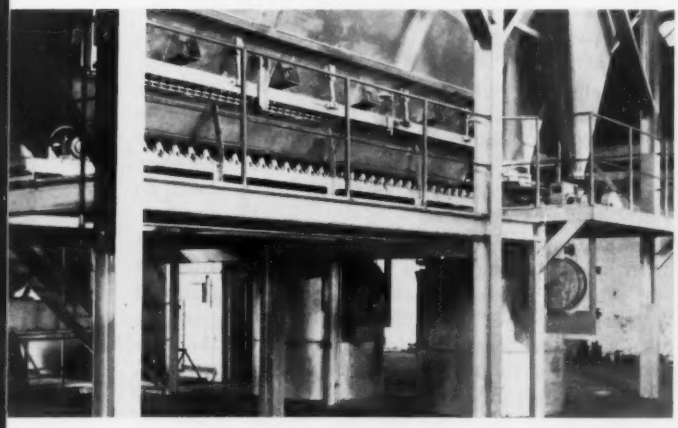


Fig. 2—Hoppers for return sand, bentonite and seacoal. Sand feeding device now has enclosure

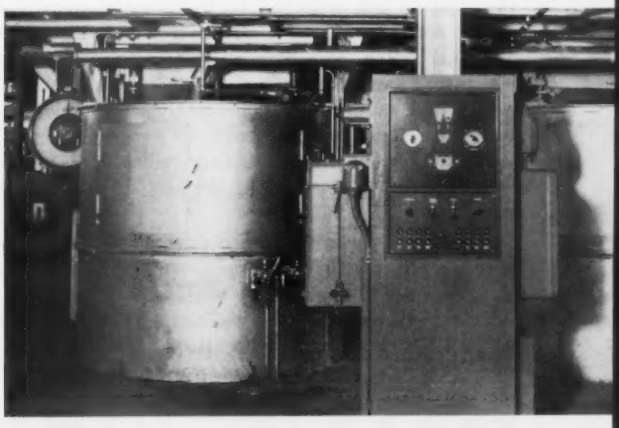


Fig. 3—One of three enclosed sand mixers shown with automatic control and ventilation devices

ther. During the time the sand passes between the condenser plates, the regulator makes a mean value of all values obtained. This mean value is compared with a value corresponding to the desired moisture content—in our case 4½ per cent. The difference between these two values is transformed into a time impulse to the water valve to determine the necessary addition of water. Fig. 5 shows the moisture control unit.

**Conveyors** — The sand preparation plant has two types of conveyors—belt and elevator. All belt conveyors are of the same width, to simplify substitution and maintenance. They are driven by electric rollers which take little room and require but little maintenance.

The return-sand elevator is placed after the magnet and the revolving screen, to give it the best possible protection against scrap, etc. The elevator buckets are made of a magnesium alloy. Their light weight reduces wear on the conveyor and cuts power consumption. The drive units of the elevators are provided with brakes, which are important in case the current should be broken. On such occasions, the earlier types of elevators poured sand into the shaft which had to be cleaned up before the elevator could be started again.

**Ventilation**—Since the sand preparation plant stands out in the open in the foundry, ventilation must be good. All places at which dust can arise are enclosed and ventilated, including all movable machine parts (Fig. 6). The ventilation of a sand preparation plant involves the risk of changes in sand composition, and the ventilation of our plant is designed to handle this problem. The seacoal and bentonite which always accompany exhausted air and are deposited in the cyclones are returned to the molding sand.

The ventilation apparatus includes a fan with a capacity of 9760 cfm. Dust is separated in three high-efficiency cyclones. From the cyclones, it is led to a hopper through rubber pipes. These pipes serve as back valves and are opened when the weight of the dust is great enough. From the hopper, the dust can be either returned to the system or led away. Tests have shown that if the dust is not returned to the sand system, the green compressive strength is reduced by about 1.25 psi after one day of operation. Therefore we return all dust taken up by the cyclones—about 638 lb per day. The analysis of this material is 31 per cent seacoal, 33 per cent bentonite and 36 per cent sand. Our reuse of it means a saving of 10,000 Swedish kroner (almost $2000) per year.

About 5.5 per cent of the dust cannot be separated by the cyclone and escapes. This loss means that almost 40 lb of dust are lost every day, of which the analysis tells us that 80 per cent is seacoal, 10 per cent bentonite and 10 per cent sand. In money, this loss amounts to 770 Swedish kroner (about $135) per year. The average grain size is only 6 microns, and, accordingly, the escape of this dust contributes to an increase in the permeability of the molding sand.

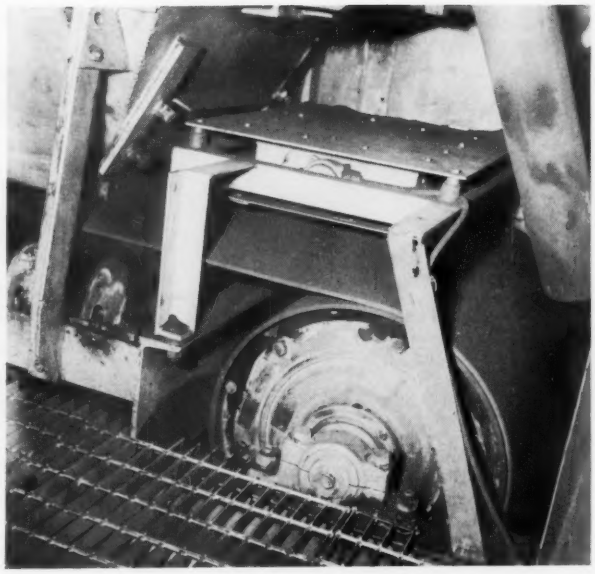


Fig. 4—Light plate above belt conveyor is the condenser for measuring moisture of return sand

**The Hot Sand Problem**—A molding sand that is used several times during one working day always gets hot. In mechanized foundries, the hot molding sand often causes casting defects, especially sand drops and sand inclusions. Furthermore, hot sand sticks to hoppers, conveyors and patterns. This problem can be solved either by cooling the sand or by using it only once a day and letting it cool until the next day.

We think that the first method is preferable and that cooling should be done at the shakeout. This system can, however, not be introduced in our foundry until the molding, pouring and shakeout stations are rebuilt. Therefore, we have solved the problem provisionally. The number of returns of the sand preparation plant is expected to be low, and, therefore, the return sand hoppers are larger than they would have had to be if coolers had been installed.

No good cooler for molding sand was available when our unit was projected. The plant now contains two return sand hoppers with a total volume of nearly 3200 cu ft. If the sand in the hoppers over molding machines and on the overflow sand belt is added, a figure of 1.1 returns per day is obtained. During the working-day the temperature of the molding sand varies between 77 and 95°F, but this variation has caused no problems.

**Maintenance**—The principal tasks of the maintenance department are to prevent interruptions in operation and—if such interruptions should occur—to repair the damage as soon as possible. Maintenance schedules for all parts of the machinery are followed, and by continuous control and exchange of wornout parts in due time, our plant up to now has worked ideally. Since we have tried to use as few different machines, with as uniform parts, as possible, we have been able

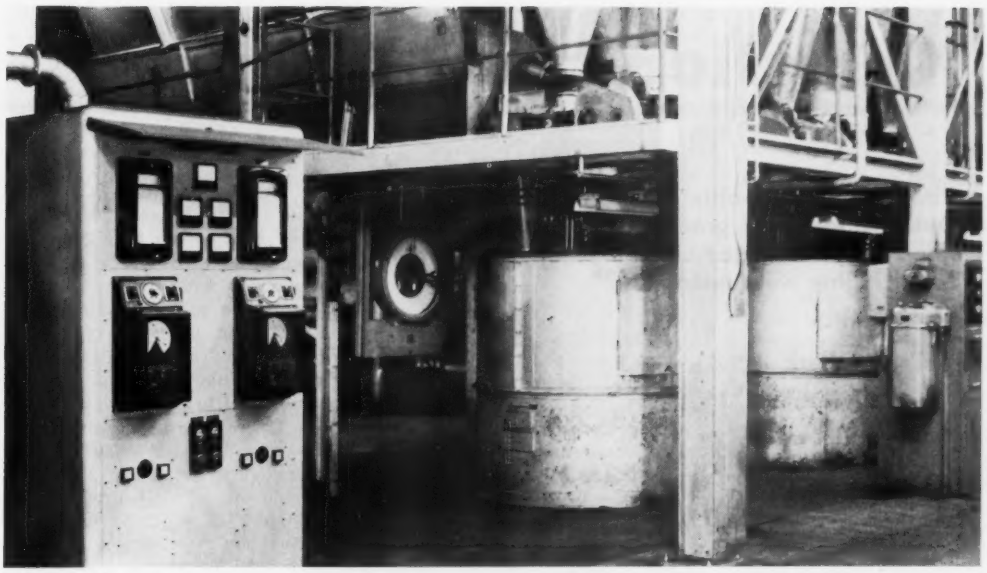
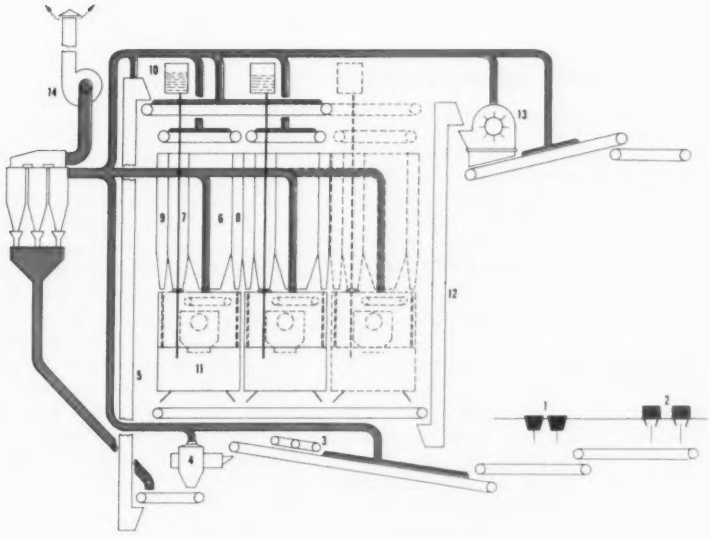


Fig. 5—Automatic control device for measuring moisture at left. Scale and one of the sand mixers are at right

to keep the costs of our stock of spare parts rather low. To reduce operation costs still more, we also have installed a central lubrication system for one group of machines. This system has turned out well and will be followed by others.

The fully automatic sand preparation plant at Norrahammar is the first of this kind in Europe and one of the most modern in the whole world. It now has been operated for more than one year with good results.

We are getting better molding sand than we did with the old sand preparation plant, and almost all casting defects caused by sand drop have been eliminated. The quality of the molding sand has made it possible for us to use system sand, so that the preparation of facing sand has been eliminated completely. Workers who formerly were used to premoisten sand and to mix seacoal, bentonite and water now are free for other tasks. Finally, this fully automatic sand preparation plant has created a basis for the automation of molding, pouring and shakeout.




1. Shakeout
2. Molding machines
3. Magnetic separator
4. Revolving screen
5. Elevator for used sand
6. Used sand hopper
7. New sand hopper
8. Bentonite hopper
9. Seacoal hopper
10. Water addition
11. Sand mixer
12. Prepared sand elevator
13. Aerator
14. Ventilating equipment

Fig. 6—Schematic view of ventilation of the sand preparation plant. Exhaust pipes shown in color

# Questions and Answers

**Fine sand with good bond quality suggested to face tablet molds . . . Outlines soil pipe practice . . . Has trouble in producing finned cylinder heads . . . Extending time not advised . . . Wants higher wear resistance**

## Facing Sand for Tablet Work

**QUESTION** Can you give us any information on a good facing for making bronze tablets, and also a good backing sand? We make bronze tablets and have trouble in obtaining a clean draw of the letters because of the weakness of the facing mixture.

**ANSWER** For tablet and other ornamental bronze casting production, fine-grain sands usually are employed so that the smoothest possible surface is obtained. French sand and its counterpart "Yankee" sand (tailor-made type developed about 1918) are conceded to give the best results, but numerous foundries satisfactorily employ other types of fine grain sands with AFS fineness of 175 upward.

In many cases all new sand is used for facing while in others a mixture of new and old sand in various ratios is employed with a 50-50 mix as average. New sand, of course, is used to provide a higher strength since its active clay content is greater than after it has been used.

You do not give any information on your present facing mixture so suggestions hardly can be made on possible remedies. You might try all new sand for a start, and if that is satisfactory, then go to various proportions of that with old sand. Possibly your new sand may be weak due to low clay content. If that is so, try small additions of bonding clay or southern bentonite until the strength is built to the desired point.

## Wants To Produce Soil Pipe

**QUESTION** We will appreciate receiving information on the analysis of iron used in making cast iron soil pipe and the procedure followed in its production.

**ANSWER** Composition of gray iron for soil pipe and fittings will vary to some degree depending on practices of the particular foundry. In general, the average is around 2.25 per cent Si, 0.110 per cent max S, 0.60 per cent Mn, 0.90 per cent max P, and 3.35 per cent TC.

Some soil pipe is produced by the centrifugal casting process, but the usual practice is to mount two half patterns on a board with a long central runner between the two. Runner is in the cope and has branches or gates spaced about 2 in. apart which lead into the casting cavities. With 5-ft. pipe usually four downgates or sprues equally spaced introduce molten metal into the runner through use of an elongated ladle, termed a "bathtub," which has four lips with the same spacing as the sprues.

As you undoubtedly know, green sand cores are used in making soil pipe from the same type of sand employed for the molds. Cores are made on perforated arbors formed of seamless steel tubing about 7/8-in. less in diameter than the desired core diameter. In manufacture of cores the arbors, moistened with water, are rotated mechanically or by hand under a sand hopper with a narrow slot opening. Hopper is about 3 ft above the arbor, and the sand falls with sufficient force to adhere satisfactorily. Proper diameter of the core is obtained by a steel blade or "doctor" mounted parallel to the axis of the arbor.

## Making Finned Cylinder Heads

**QUESTION** Can you supply us with any information on a suitable sand mixture for producing finned cylinder heads in gray iron? The casting is about 12 in. in diam with 3/8-in. wall. The fins are 1/8 in. thick and 4 1/4 in. deep. A clean surface is required on the fins. We have tried $CO_2$ plus coal dust mixture without much success. The fins have very little taper, are difficult to draw except in oil sand and have poor finish.

**ANSWER** Production of molds for finned cylinder heads and barrels is somewhat difficult even when the fins have a suitable taper, the spacing is not too close, and the depth only a few inches. In your case the problem is intensified by lack of taper, deep draw and close spacing, and some experimental work will be necessary to develop a suitable sand mix as well as a procedure.

One foundry uses a natural bank sand with a clay content under 2 per cent as the base for several oil-sand mixtures. This sand is compounded with fine and coarse silica sands to provide desired characteristics for different types of finned castings. The bank sand has a fineness of about 90, and the oil-to-sand ratio is 1 to 55 by weight.

Clay content of the bank sand apparently is sufficient to give enough green strength. For clay-free sand employed in production of aluminum alloy finned heads and barrels, the green strength is developed by addition of 1 to 2 per cent cereal. Similar practices are followed in making both gray iron and aluminum castings—use of a fine sand as facing to the tops of the fins and filling the remainder of the mold with a coarser, more open sand.

Molding practice is to throw forcibly by hand a 1/2 to 1 in. layer of sand on the pattern so that it penetrates to the bottoms of the valleys between the fins. This sand is tucked in by the fingers and the necessary nails or reinforcing wires are placed between the fins. Additional facing sand covers the contour of the fins, and the remainder of the flask is filled with backing sand. The mold is jolted a definite number of times to provide the desired compaction of the sand. Sand may be butted off with a rammer and struck off, or just struck off, depending on the practice. The pattern then is vibrated and the mold drawn.

In several instances carbon dioxide molding practice has been used to produce finned castings. Practice appears to be similar to that of oil-sand in that the mold is faced with silicate-bonded sand and backed up with regular green sand. Tipper in the June, 1955, issue of FOUNDRY mentions that one foundry uses a silicate-bonded facing sand with 4 per cent binder, 1/2 per cent pelleted pitch and 1/4 per cent paraffin. Clay-free sand has a fineness of about 70. Half patterns are rapped and stripped before gas hardening. The half molds are assembled and gassed through the sprue opening for about a minute at a pressure of 15 to 20 psi. Hardened molds then are cored up.

You did not mention whether your lack of success with the process was due to trouble in drawing or unsatisfactory molds. Perhaps you tried

gassing from the outer surface and did not secure proper hardening of sand between the fins. In gassing from the outer surface the injection probes must extend down between the fins and vents must be provided on the pattern to insure that the gas penetrates all the way through. A better procedure would be to gas through the pattern, with the injection holes located in the roots of the fins.

Perhaps you are adding too much coal dust which results in friable edges. If green strength is low you might try addition of 1 to 2 per cent fire clay. Use dry compounds rather than liquid parting on the patterns. Sometimes rubbing the pattern with dry graphite helps to give a good parting.

## No Advantage in Holding Time

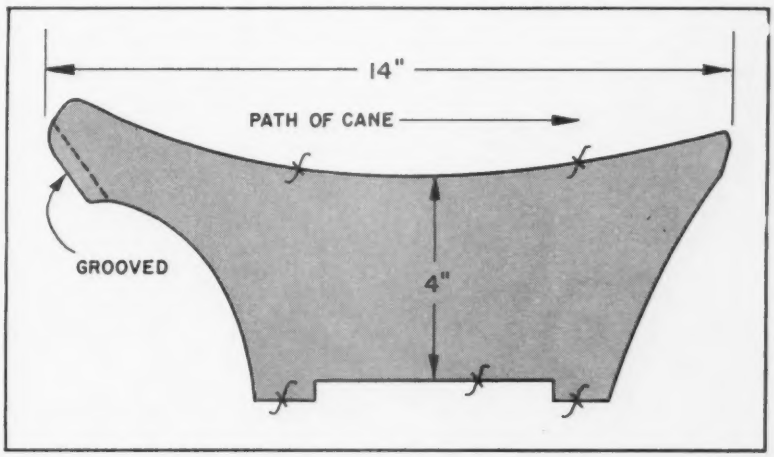
**QUESTION** We have two 30-ton pulverized coal-fired annealing ovens in which we hold our malleable castings at 1650°F for 44 hr, then seal the furnace and allow it to cool to 1000-1100°F at the rate of about 3° per hr. Usually at that temperature the doors are opened gradually to speed up the cooling to handling temperature. Would any difficulty be encountered with the castings if the oven temperature was permitted to drop to 650-700°F before the doors were opened—rate of temperature drop being 3° per hr?

**ANSWER** Keeping the doors closed on your annealing ovens until the temperature drops to 650-700°F will have no effect on the castings, but it certainly would add considerably to the time before the castings could be shipped. From that point of view it would not be advisable to extend the time any more than is necessary.

Presumably the 1000-1100°F temperature at which the doors are opened refers to oven temperature and not to casting temperature. Consensus is that if the castings are held through the critical range for the proper length of time to precipitate all of the carbon in the temper form, nothing is gained by extending the time. Critical range for commercial malleable probably is 1320 to 1350°F. Usually the castings are held until they reach 1200°F. The 1200°F temperature is that of the castings, however, and not that of the oven. In periodic ovens with the castings packed in pots there is a marked difference between the oven temperature and that of the castings, probably around 100°, so it is advisable to hold the furnace until it reaches 1100° as you are doing.

## Increasing Wear Resistance

**QUESTION** We are making some gray iron castings, termed "T" turn plates, used on mills for squeezing sugar cane for extraction of juice. The turn plates are about 6 ft long, about 4 in. thick in the center and 14 in. across the top. They are machined almost all over to the shape shown in the accompanying sketch, allowing about ¼ in. for that operation. Grooves also are machined on the heavy lipped side. These plates




Gray iron turn plate casting for sugar mill rolls is subject to abrasive wear

are located between the three rolls in the sugar mill, and direct the course of the cane between the rolls. The turn plates suffer considerable wear due to soil, etc. on the cane and we would like to make castings with better resistance to wear than at present. We use only No. 1 machinery cast scrap for our mixture.

**ANSWER** Since the turn plate casting has to be machined all over, some experimental work will have to be carried on to determine the best procedure for obtaining increased wear resistance without making the casting unmachinable. Ability to machine will depend to some degree on sturdiness of the machine tools and cutting tools employed.

Hardness and wear resistance of this heavy-section casting can be increased by several methods. A logical one is to try to increase the rate of cooling of the casting without changing your all-scrap mix. This can be done by use of a heavy chill along the center. Chill width should not be too great or it will result in the outer wings of the casting being too hard. Probably a width of 5 to 6 in. will serve, but it may have to be increased or decreased according to results obtained. Possibly instead of having the chill in direct contact with the metal, a thin layer of sand might be interposed which will decrease the chilling effect.

Wear resistance can be increased by addition of a carbide stabilizer such as chromium, but usually it is advisable to use that in combination with a chill-restraining element such as nickel or copper. Perhaps the addition of 0.50 per cent chromium with the same quantity of nickel or copper will give the desired improvement. Instead of depending on all gray iron scrap for your raw material charge, we believe you will get better results by substituting a generous amount of steel scrap to obtain a somewhat lower total carbon content.

To that end we suggest a mixture containing 35 per cent steel scrap, 65 per cent gray iron scrap, with the addition of ferroalloys of silicon and manganese to bring those elements within the desired ranges. The silicon addition may be in the form of lump ferrosilicon, or silicon briquets, and a ratio of 10 lb of silicon per ton is suggested. This silicon may be 12½ lb of 80 per cent ferrosilicon or a suitable number of silicon

briquets or perhaps silvery pig.

Amount of manganese required is 4 lb per ton which may take the form of 5 lb 80 per cent ferromanganese or a suitable number of manganese briquets. Additionally 0.50 per cent chromium and a like amount of nickel or copper are added. Further the iron over the spout is inoculated in the ladle with 2 lb per ton of 80 per cent ferrosilicon or equivalent amount of other graphitizing agent.

## Recovery of Chromium Is Low

**QUESTION** We make our own gray iron castings for plant maintenance work, and recently have been trying to make grate bars for a sintering machine with a view of reducing breakage. Castings are about 2 ft long with 1⅛ in. square section, and fail by a combination of impact, abrasion and elevated temperature. We tried to introduce a small amount of chromium (1 per cent) using 8-mesh ferrochromium, adding some soda ash for desulphurizing at the same time in a small ladle with the iron temperature between 2500 and 2600°F. Iron analysis showed 3.44 to 3.68 TC, 1.46 Si, 0.069 to 0.107 S, 0.87 to 0.90 Mn and 0.56 to 0.68 Cr. Sulphur content of our iron often is 0.15 due to high-sulphur coke.

While due allowance was made for loss of alloying element and contained Cr in the ferroalloy, we were considerably short of the 1 per cent aim. Also the castings seemed to chill to some extent, judging by the appearance of microsections from the riser sample and from the fact that one bar broke in cleaning. Before making any further attempts, could you give us information on: 1) Minimum iron temperature for alloying in the ladle. 2) Maximum allowable S to reduce risk of increasing chill when Cr and/or Mo are added. 3) Maximum size of ferroalloy for ladle addition. 4) A high-alloy iron containing 28-30 Cr and 1 Ni has been recommended for grate bar castings. Is that melted in the cupola or electric furnace?

**ANSWER** According to available information, recovery of chromium from ferrochromium additions to the ladle should be 85 per cent or more, and perhaps your failure may be due to a combination of circumstances rather than one. Usual recommendation for size is 20-mesh and under, and the material should be added in the stream flowing into the ladle or thrown into the ladle after a couple of inches of metal is on the bottom.

Melting temperature of ferrochromium ranges from 2300 to 2600°F, and to be on the safe side it is advisable to have the iron temperature over the maximum indicated. Possibly some of the difficulty with lower iron temperature might be overcome by preheating the ferroalloy in a suitable container with an oil or gas-fired torch before adding to the ladle.

Difficulty with chilling tendency in your castings is not caused by the sulphur, but by the addition of the chromium. While the sulphur content of your iron is somewhat high, it should not result in any trouble because more than sufficient manganese is present to convert all the sulphur to manganese sulphide. It might be pointed out that the silicon content of your iron appears somewhat low for the section size involved—that is, it would have a tendency toward chilling, and chromium being a potent carbide stabilizer enhances that condition.

Your remarks about the indications of chill in the specimen examined are evidence of the previous remarks, and if further additions of chromium are made you undoubtedly will find a more marked chilling effect. That tendency could be overcome by addition of some graphitizing agent in the ladle. Try the addition of 0.50 per cent Si in the form of ferrosilicon crushed to eight-mesh size. In addition, you might try 0.50 per cent Mo with the chromium.

Possibly the tendency toward breakage might be alleviated by heat treatment at 1000°F and cooling in the furnace. As far as the extremely high chromium alloy iron suggested for grate bars is concerned, we would expect that the material is melted in the electric furnace, but by use of chromium in briquet form, the alloy could be produced by cupola melting.

## Core Department Needs Study

**QUESTION** We operate a mechanized gray iron foundry making castings ranging in weight from ounces to 10 tons. We find that our core costs are prohibitive and also that their quality is not up to par. At present we are using lake sand, iron oxide and silica flour. We have a modern gas-fired oven and mix our sand in portable type mullers. We have not been able to use a slab core that will not burn in.

**ANSWER** From your statements it appears that your core department is in need of a good overhauling to determine where the trouble lies, but the situation may not be quite as bad as it seems unless your remarks are based on carefully maintained records.

We gather from the mention of use of lake sand, iron oxide and silica flour that the bonding agent is core oil. It may be that the tendency is to use more binder than necessary. In general more than 2 per cent by weight of core oil seldom is required, often 1 per cent or less is employed with satisfactory results. Hence, a good starting point would be to check the various mixes and determine whether or not reductions in binders can be made.

Since you do not give any information on your present core mix for slab cores and their location in the mold, it is difficult to determine the cause of trouble. You might try a mixture of 90 per cent lake sand and 10 per bank sand by weight, and add to that 1 per cent cereal and 1.5 per cent core oil by weight. Additionally, the cores might be coated with a good refractory wash. As to literature on cores, we suggest you obtain a copy of *Foundry Core Practice*.

## Steel Inserts Cause Problem

**QUESTION** We have a casting in which we mold a piece of steel 1 x 1¼ in. with the end of the steel projecting from the casting, and have trouble with blow holes near the steel. We can lick the trouble by gating the casting so that hot metal will run over the steel as the casting is being poured but this doesn't work out for other reasons. We also know it can be licked by using tin-plated steel, but that is too costly. No doubt the trouble is with moisture condensing on the steel. We have tried very dry sand, but that doesn't help much.

**ANSWER** While difficulty in pouring molten metal around solid inserts generally is due to condensation of moisture, it also can result from use of inserts which are not clean. Oil, grease, traces of rust or oxide, etc. generate gases when the molten metal comes in contact with them and form the blow holes. To make sure that the inserts are clean it is suggested that they be given a good abrasive blasting and then placed in a warm spot.

Inserts should be placed in the mold cavity at a temperature above that of the sand to eliminate the problem of moisture condensation, and preferably the mold should be closed and poured as soon as possible. If the insert has to remain in the mold for some time before pouring, it is good practice to leave the mold open until just before pouring. As indicated, the inserts do not have to be heated to a high temperature before placing in the mold.

With the inserts placed in the mold at a temperature above that of the sand, it is hardly likely that after a long period of time they would become cooler than the sand and pick up moisture, but it might be advisable on long standing to touch up the inserts with a torch to insure absence of moisture.

CONVEYOR BELTS

# Turn on the Heat this Belt can take it!

Until now, hot materials belts suffered from many different shortcomings. Splices would fail prematurely; abrasion resistance and heat aging would be greatly accelerated as temperatures rose; the carcass of glass fabric belts required special treatments to improve adhesion (and these special treatments themselves would break down).

But now, all these unsatisfactory qualities have been eliminated by the new U. S. Rubber Type *HTB* Glass Fabric Belt. Thoroughly tested on the toughest kinds of hot materials jobs, the U. S. Type *HTB* has given maximum performance under maximum operating temperatures.

**COMPARE THESE ADVANTAGES**

- Heat resistant cover of specially compounded high-temperature Butyl rubber to withstand excessive heat.
- *Exclusive* all-glass carcass, woven to be self-cushioning and to prevent internal abrasion . . . eliminates premature char-out . . . maintains full strength throughout the longer life of the belt . . . gives life-of-the-belt adhesion without special treatment . . . provides superior flex life, fastener-holding strength, and heat aging.
- Thinner belts for better heat dissipation, because bulky asbestos and duck plies have been eliminated.
- New high-temperature butyl cover and all-glass fabric carcass combine to provide perfectly balanced belt of unexcelled heat resistance.
- Belt can be engineered to specific conditions of heat, abrasion, and operating tensions.
- Lower cost-per-ton because of competitive price and longer belt life.

Available at any of the 28 "U. S." District Sales Offices, at selected distributors, or write us at Rockefeller Center, New York 20, N. Y. In Canada, Dominion Rubber Co., Ltd.

Mechanical Goods Division

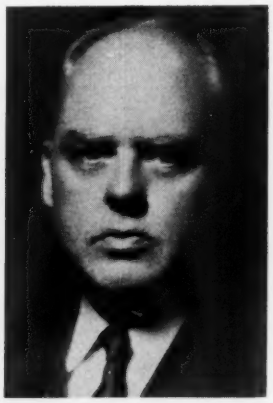
**United States Rubber**

# Men of Industry

● ORVAL GRAENING
. . . *foundry division v. p.*

● OTTO A. PFAFF
. . . *Wheelabrator chairman*

● VERNE E. MINICH
. . . *honorary board chairman*



● WILLIAM W. C. BALL
. . . *Taylor & Fenn pres.*

**ORVAL GRAENING,** since 1952 sales manager of the Foundry Division, Woodruff & Edwards Inc., Elgin, Ill., was elected vice president of the division. He joined the company in 1929. **Howard F. Lewis** was also elected a vice president of the company, and will continue as general sales manager. **Carl O. Tolf Jr.,** since 1952 manager of the company's Wade Division, was named vice president of the division.

**Joseph F. Orloff** was named general superintendent, Saginaw Malleable Iron Plant, Central Foundry Division, Saginaw, Mich. He was formerly superintendent of finishing there. Other changes have been made in the plant's organization. **Arthur J. Karam,** formerly manufacturing superintendent, becomes production manager. **Robert W. Leppien,** foundry superintendent, was appointed manufacturing superintendent. **William B. Goodrich** was named superintendent of finishing, **Steve Spess** superintendent of production control, and **Francis B. Howard** foundry superintendent. **Ralph F. Mesack** was made superintendent of standards and methods.

**Hermann K. Intemann,** for the past year executive vice president, was appointed president, Electro Metallurgical Co., division of Union Carbide Corp., New York. With the company since 1930, he was previously associated with other divisions of the company, including Bakelite Co., where he was vice president-general sales manager.

● **Verne E. Minich** was named honorary chairman of the board, and **Otto A. Pfaff,** chairman of the board, Wheelabrator Corp., Mishawaka, Ind. In 1908 Mr. Minich founded the Sand Mixing Machine Co., New York, forerunner of American Foundry Equipment Co., Mishawaka, Ind., which later became Wheelabrator Corp. Since he retired from active service in 1935, Mr. Minich has been serving as chairman of the board. Mr. Pfaff joined the company in 1916, and became treasurer, secretary and general manager. He will continue to serve as president, a position he has held since 1941. Mr. Pfaff is a former president of the Foundry Equipment Manufacturers' Association.

**Ellsworth H. Sherwood** was elected vice president, and **Lawrence A. Pomeroy Jr.,** assistant manager, International Division, National Malleable & Steel Castings Co., Cleveland. Mr. Sherwood attended Ohio State University and University of Michigan and joined the company's sales department in 1920. He was named assistant vice president of the International Division in 1956. Mr. Pomeroy, a graduate of Yale University, has been traffic manager since he joined National Malleable in 1946.

**Ralph W. Cadman II** and **Roy A. Hunt** were elected directors, A. W. Cadman Mfg. Co., Pittsburgh. Mr. Cadman is associated with Pittsburgh Piping & Equipment Co., Pittsburgh, and Mr. Hunt is with Mellon National Bank & Trust Co., there.

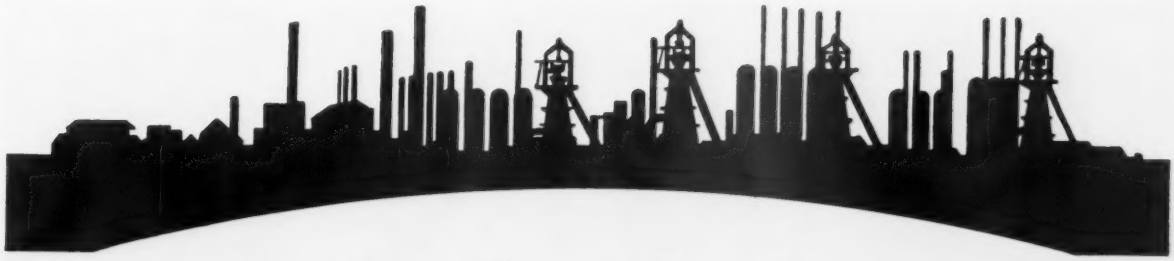
● **William W. C. Ball,** formerly vice president, was elected president, Taylor & Fenn Co., Hartford, Conn. He joined the company in 1915, became foundry manager in 1931, vice president and a director in 1938, and was appointed general manager in 1944. Mr. Ball has served as a director of the Gray Iron Founders' Society, and is a past president and a member of the current administrative council of the National Foundry Association.

**William B. Summers** was appointed abrasive field sales manager in the Cleveland-Pittsburgh districts, Carborundum Co., Niagara Falls, N. Y. He succeeds **F. M. Mansbery,** who has joined Kolcast Industries Inc., Cleveland, as sales manager. Mr. Summers joined Carborundum Co. in 1946 as a sales engineer. He became district sales engineer and until recently was abrasives field sales manager on the Pacific Coast.

**Edwin R. Broden,** president, SKF Industries Inc., Philadelphia, and **Richard M. Mock,** president, Lear Inc., Santa Monica, Calif., were elected directors, Alloy Precision Castings Co., Cleveland.

**Alfred Sugar** has resigned as vice president and technical director, Alloys & Chemicals Mfg. Co., Cleveland.

**Lynne S. Denne** has been appointed national sales manager, Jo-El Co., Cleveland, to co-ordinate services of its engineering representatives in sales of aluminum bottom boards and



# Strike Ends at WOODWARD

Woodward Iron Company is happy to announce that the strike which caused a shutdown of its plant has been terminated, with negotiation of a new contract with its workers, and operations were resumed April 12th.

We take this opportunity to express to all of our customers our deep appreciation for their understanding and their patience during the recent trying period. We will make every effort to serve all requirements of our customers for quality uniform Woodward iron as promptly as possible, and solicit a continuance of the support that has been so loyally given us by our good friends in the foundry trade throughout the years.

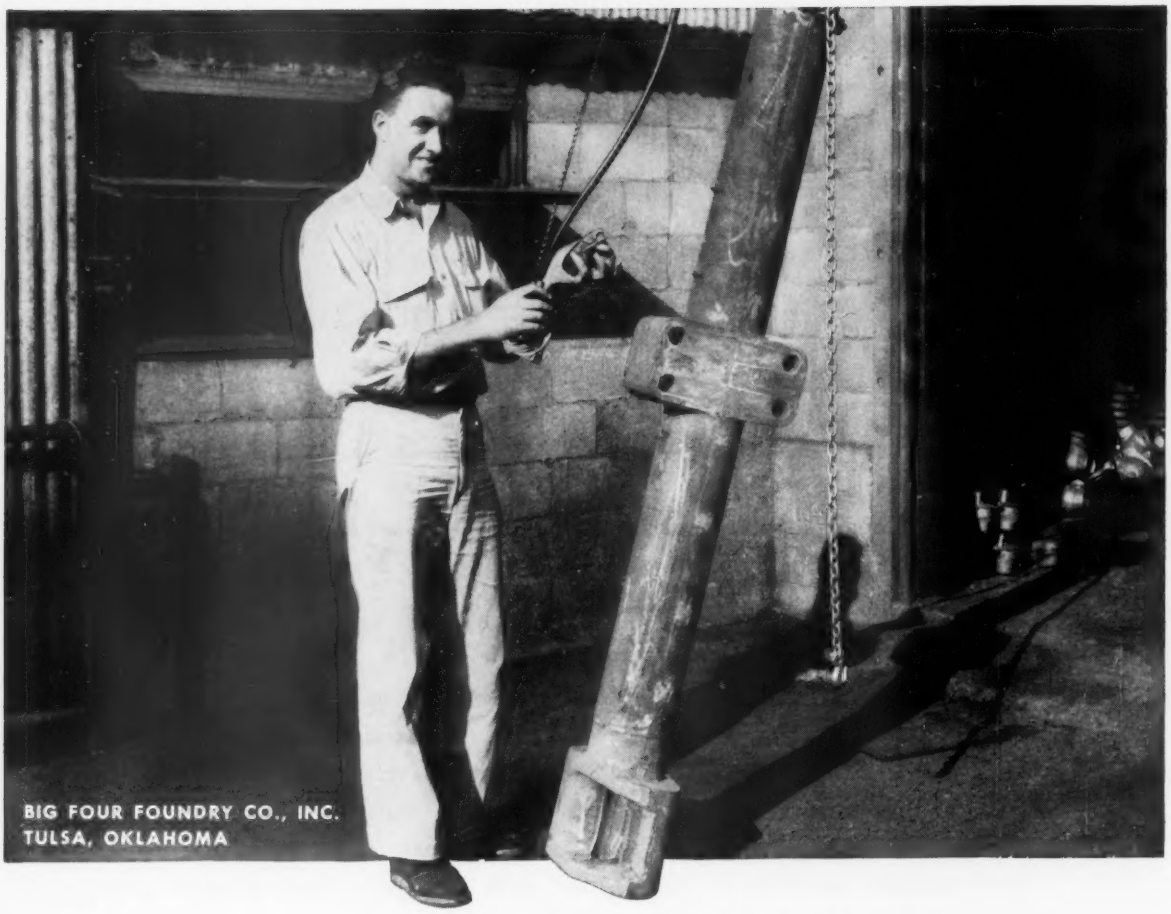
**For quotations, write or call our**
**Sales Department, Woodward, Ala.**
**Phone Bessemer, Ala. 5-2491**
**or Sales Agents for territory north of Ohio River:**
**HICKMAN, WILLIAMS & COMPANY with Sales Branches at—**

**609 Bona Allen Building, Atlanta 3, Ga.; 230 North Michigan Avenue, Chicago 1, Ill.; First National Building, P. O. Box 538, Cincinnati 1, Ohio; 1659 Union Commerce Building, Cleveland 14, Ohio; 1203 Ford Bldg., Detroit 26, Mich.; P. O. Box 335, Duluth 1, Minn.; 412 Guaranty Bldg., Indianapolis 4, Ind.; 70 Pine St., New York 5, N. Y.; 1500 Walnut Street Bldg., Philadelphia 2, Pa.; 1910 Clark Bldg., Pittsburgh 22, Pa.; 902 Syndicate Trust Bldg., St. Louis 1, Mo.**

# Woodward Iron Company

**WOODWARD, ALABAMA**

*Independent Since 1882*




# One core oil does the job— cuts bake-out time 43%!

## Cities Service Delco Core Oil wins high praise

At Big Four Foundry, castings range in size from five ounces to 4500 pounds . . . and recently one casting required 37 individual cores.

Yet, despite this tremendous range of work, Big Four uses only one core oil . . . Cities Service Delco #934.

"We put cores of five pounds on the same racks with those weighing 500 pounds," reports Asst. Supt. R. F. Forsythe. "But their dry strength is never lost and the cores always have good collapsibility. What's more, with Delco #934, we've been able to cut bake-out time from 3½ hours to 2 hours!" It's easy to see why we do business with Cities Service."

Like Mr. Forsythe, you'll find Cities Service can help save time, confusion, and operating costs with a core oil precisely suited to your operation.

For the full story, talk with a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, 20 North Wacker Drive, Chicago 6, Illinois.

**Typical of Huge Castings** made at Big Four Foundry is this one getting finishing touches. Cores for every pattern and every size of casting are made with Cities Service Delco #934 Core Oil. Big Four bakes 5-lb. cores on same racks with those weighing 500 lbs.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

● FRANK G. HOUGH
*. . . board chairman retires*

● L. T. SYLVESTER
*. . . Mathews Conveyer chairman*

● ODD H. McCLEARY
*. . . pres., Mathews Conveyer*

● BENJAMIN J. DAVIS
*. . . Athol Machine v. p.*

core plates for foundry operations. Mr. Denne formerly operated his own industrial sales organization.

● **Frank G. Hough** has retired as chairman of the board, Frank G. Hough Co., Libertyville, Ill. In 1933 he founded the company in Chicago and in 1939 it was moved to Libertyville. He continued as president until 1956, when he became board chairman. Mr. Hough plans to remain in the manufacturing business and will open an office at 158 East Cook St., Libertyville.

● **Richard V. Grogan** was appointed West Coast representative of the Foundry Products Division, Archer-Daniels-Midland Co., Cleveland, with headquarters in the Los Angeles office. Previously Mr. Grogan represented the company's Pol-mer-ik Division in 11 western states.

● **Thomas F. Patton,** purchasing agent, Hempfield Foundries Co., Greensburg, Pa., was elected treasurer and a director of the company. A graduate of University of Pittsburgh, in 1954 Mr. Patton joined Pittsburgh Piping & Equipment Co., Pittsburgh, subsidiary of Hempfield Foundries.

● **L. T. Sylvester** was elected chairman of the board of directors, and **Odd H. McCleary,** president, Mathews Conveyer Co., Ellwood City, Pa. In 1911 Mr. Sylvester joined the company's Canadian subsidiary, Mathews Conveyer Co. Ltd., Port Hope, Ont., where he became treasurer, managing director, and president in 1949. He was named senior vice president of Mathews Conveyer Co. in 1951 and president in 1952. Mr. McCleary, with the company since 1935, worked in engineering and sales until 1949 when he was appointed assistant general manager. He was elected vice president and general manager in 1952, as well as senior vice president of the Canadian subsidiary.

● **Forrest E. Noggle,** for the last 10 years in the consulting division, Westover Corp., Milwaukee, was named a vice president of the company. His duties will include supervision of all field engineers.

● **Benjamin J. Davis** was elected vice president, general manager and a director of Athol Machine & Foundry Co., Athol, Mass. He was formerly general manager and sales director. Also elected directors were **Douglas R. Starrett,** vice president, L. S. Starrett Co., Athol, and **Mrs. Effie O. Hill,** assistant treasurer of Athol Machine & Foundry Co.

**Henry J. Harden** was appointed abrasive engineer in eastern Ohio, Peninsular Grinding Wheel Division, Abrasive & Metal Products Co., Detroit, with headquarters in Cleveland.

● **Harry J. Camillery** was recently elected vice president, Fairview Foundry Inc., Poughkeepsie, N. Y., division of Intertype Corp., Brooklyn, N. Y. He joined the company as general superintendent in 1954. Previously he was metallurgist, American Radiator Co., Bayonne, N. J., vice

● RICHARD V. GROGAN
*. . . West Coast sales, ADM*

● THOMAS F. PATTON
*. . . becomes treasurer*

● FORREST E. NOGGLE
*. . . Westover Corp. v. p.*

● HARRY J. CAMILLERY
*. . . Fairview Foundry v. p.*

**SOUTHERN BARGE TERMINAL**—Thousands of feet of tubular material for practically all the major and independent oil companies in the Gulf Coast area are handled here. Said Reuben Albaugh, Vice-President and General Manager, "Take a look at our yard . . . there's plenty of rough work to be done out there every day. That's why we specified *Clarklift*—it's the most stable and rugged, the easiest to handle, the most dependable truck we've ever tried."

# HERE'S WHAT HOUSTON THINKS OF THE NEW CLARKLIFT

If everything's bigger in Texas (as any good Texan will tell you), then Houston can claim much of the credit. Its 1,000,000 population, doubled in the past ten years, makes it the largest city in the South. Yet industrial leaders everywhere agree: the *real* growth still lies ahead.

What a challenge this is to *Clarklift!* And what a reception by Houstonians in industry from oil to bottling, from cotton and chemicals to food storage. No matter what the job in any one of dozens of industries, there's a *Clarklift* built to handle it. Putting it Texas-style . . . "they do it bigger!"

Drivers like its easy-handling comfort, mechanics praise the swing-back hood and simplified servicing. A typical management reaction: "We like it so well, we're re-designing our *entire* handling system to take fullest advantage of the *Clarklift's* capabilities."

Forty-five million tons moved through the famous Ship Channel last year, another twenty million by railroad and truck lines. That's the pace in Houston today . . . a pace that's made for *Clarklift.*

You can get more details by calling your local Clark dealer or by writing us direct. On request, we'll arrange a demonstration in your plant.

Industrial Truck Division

CLARK EQUIPMENT COMPANY
Battle Creek 16, Michigan

CLARK EQUIPMENT

CLARKLIFT is a trademark of Clark Equipment Company

(Advertisement)

Circle 629 on Inquiry Card—Page 51

**UNION BOTTLING WORKS**—Over one million cases of Dr. Pepper left here last year for thirsty Houston. Said management: "Our facilities are modern and so are our methods and equipment. The *Clarklift* fits right in the picture . . . it's fast, efficient, modern in every detail."

**SYD E. CULBERTSON COMPANY, INC.**—"We move more than 500 tons of pipe a day with our *Clarklift*—it's a great truck," says W. B. Schell, Executive Vice-President of the largest pipe coating and wrapping firm in the Gulf area. "What's more—our records show that our *Clarklift* will more than pay for itself in the first year."

**CALCOT TEXAS WAREHOUSE**—There's room for 75,000 bales of cotton in this warehouse. Expert driver, Bill Adams, had this reaction to his *Clarklift*: "I've been on lift trucks since '49—this is the best handling truck I've ever driven. You can't beat it for loading and unloading boxcars."

**GOODYEAR TIRE AND RUBBER COMPANY**—This synthetic rubber plant is the largest in the world. It works a 24-hour day, 7-day week. Put to the test of handling raw materials and supplies at this energetic pace, this LP-gas *Clarklift* ". . . operates under severe conditions, and always operates well."

**UVALDE ROCK ASPHALT COMPANY**—Here comes another load of asphalt tile ready for shipping. Said management, ". . . we especially like two things about our *Clarklift*—the ease of maintenance and the safety features. We also like the brake that automatically goes on when the driver leaves his seat."

## MEN OF INDUSTRY

● KENNETH E. BLESSING
*. . . division sales mgr.*

● LAWRENCE W. KOHLMEYER
*. . . Wheelabrator N. Y. mgr.*

● GEORGE F. JONES
*. . . district sales engineer*

● CLARENCE H. MINGLE
*. . . marketing director*

president-superintendent, Pitz Foundry, Brooklyn, N. Y., and later operated his own foundry in Hillsdale, N. Y.

● **Kenneth E. Blessing** has been named sales manager of the Dust and Fume Control Division, Wheelabrator Corp., Mishawaka, Ind. He is a graduate of Purdue University. **Lawrence W. Kohlmeyer** has succeeded Mr. Blessing as district manager of Wheelabrator's New York office. **George F. Jones** takes over Mr. Kohlmeyer's former duties as district sales engineer in the Chicago office.

● **Harold D. Prior** was named technical director, Chas. Taylor's Sons Co., Cincinnati, subsidiary of National Lead Co., New York. In 1936 he joined the company's Titanium Alloy Mfg. Division, Niagara Falls, N. Y., and was district sales manager of the division's eastern territory from 1945 to 1955. Recently he was manager of National Lead's Washington office.

**Robert R. Dreibus,** formerly vice president-sales, Harvill Corp., Los Angeles, has been elected president of the company, succeeding **Richard B. Clevering,** who has resigned. Recently Mr. Dreibus was with Precision Castings Co., Syracuse, N. Y., a division of Harsco Co., Harrisburg, Pa.

● **Kenneth H. Pierce,** for the past two years production manager, Precision Castparts Corp., Portland, Oreg., was appointed sales manager. Prior to joining the company three years ago, he was associated with Longview Fibre Co., Longview, Wash.

● **Newlin T. Booth Jr.,** president, Deemer Steel Casting Co., New Castle, Del., was elected to membership in Young Presidents' Organization, a national association of executives who, before becoming 40 years of age, attain the presidency of an industrial company doing a million dollar minimum gross business. Mr. Booth is a director of the National Foundry Association.

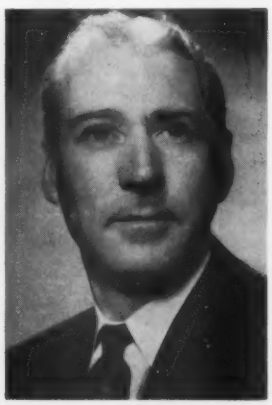
● **Clarence H. Mingle,** vice president, Gates Rubber Co., Denver, has been appointed director of marketing. With the company since 1923, he became head of technical development and research in 1941 and was named a vice president in 1944. **Carl Mullen,** director of industrial engineering, has assumed responsibility for direction of development and research.

**Gerald L. Lee,** formerly with the nonferrous section of International Nickel Co.'s research laboratory, Bayonne, N. J., has been transferred to the iron and nonferrous castings section of the Development and Research Division, New York, where he will be associated with **J. S. Vanick.** Mr. Lee's work since he joined the Bayonne laboratory 12 years ago, has included improving refractories used in precision casting processes.

● **William E. Ryder** recently joined Belmont Smelting & Refining Works Inc., Brooklyn, N. Y., as general sales manager. He was formerly vice

● HAROLD D. PRIOR
*. . . technical director*

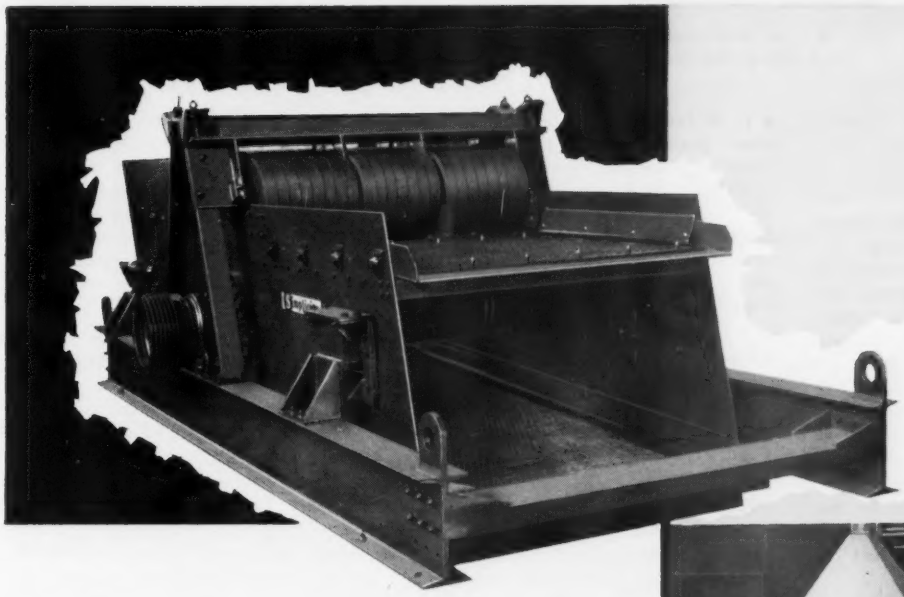
● KENNETH H. PIERCE
*. . . manager of sales*

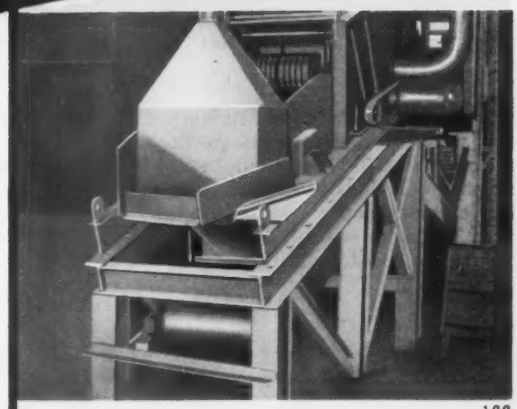


● NEWLIN T. BOOTH JR.
*. . . Young Presidents' member*

● WILLIAM E. RYDER
*. . . joins Belmont Smelting*

# SALVAGE YOUR VALUABLE MOLDING SAND with a SIMPLICITY RING-TYPE CRUSHER SCREEN





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**You profit two ways with Simplicity's Ring-Type Crusher Screens**

- Your used core and molding sand is crushed and screened for re-use in one operation, saving the cost of new sand.
- Transportation and dumping costs of used sand are eliminated.

This unit combines the Simplicity heavy-duty vibrating screen with free-turning cast rings mounted over crushing plates. One to three sets of rings can be supplied, depending upon the maximum lump size to be crushed.

Simplicity ring-type crusher screens are paying their way in foundries producing magnesium, steel, malleable and grey iron castings throughout the United States.

**Available in many models and sizes. For complete information write today for the name of our sales engineer in your area; and turn your waste into profits.**

**SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.**

**FOR CANADA:** Simplicity Materials Handling Limited, Guelph, Ontario.

**FOR EXPORT:** Brown and Sites, 50 Church Street, New York 7, N. Y.

**simplicity**
TRADE MARK REGISTERED

**ENGINEERING COMPANY • DURAND 7, MICHIGAN**

## MEN OF INDUSTRY

● S. L. GERTSMAN
*. . . Canadian Govt. branch head*

● C. W. BOETTCHER
*. . . becomes sales mgr.*

● HERBERT J. NIEMANN
*. . . joins Pangborn Corp.*

● WILLIAM A. MERRIMAN
*. . . joins Erie Forge & Steel*

president and manager of eastern operations, K. W. Battery Co., Skokie, Ill.

● **S. L. Gertsman** has been named chief of the Physical Metallurgy Division Mines Branch, Department of Mines and Technical Surveys, Ottawa, Ont., after two years as assistant chief. He first joined the department as a research metallurgist in 1941, and during World War II served the Canadian government in metallurgical inspection and research. Associated for a period with the former Hull Iron & Steel Foundries Ltd., Hull, Que., where he became director of research and foundry superintendent, he returned to the Mines Branch in 1946.

● **Frederic S. Claghorn,** formerly sales manager of the Centrifugal Division, Fletcher Works Inc., Philadelphia, was appointed sales manager of the Foundry Division, which recently instituted a modernization program to speed production of gray iron castings.

● **C. W. Boettcher** has been appointed sales manager of the American Foundry Flask Co., division of Cromb & Gagel Inc., Kansas City, Mo. He was formerly sales manager of the flask division of Black, Sivalls & Bryson Inc., Kansas City, which recently was purchased by the new American Foundry Flask Co.

● **Herbert J. Niemann** recently joined Pangborn Corp., Hagerstown, Md., as sales engineer in the Chicago area. He was formerly executive vice president, Hydro-Blast Corp., Chicago.

**Lawrence R. May** has joined B & T Machinery Co., Holland, Mich., as vice president-general manager. He was previously associated with Cast Master Inc., Cleveland, as general manager.

● **William F. Winemiller** was appointed manager of the sales engineering department, Refractories Division, Norton Co., Worcester, Mass. **George H. Powers** has succeeded him as assistant sales manager of the division. Mr. Winemiller joined the company in 1947 and was previously chief sales engineer and manager of sales engineering. Mr. Powers, after two years as a sales engineer in the company's Worcester office, became refractories engineer in New York in 1952.

● **William A. Merriman** has joined Erie Forge & Steel Corp., Erie, Pa., as manager of castings sales. Associated in various sales capacities for 8 years with Allegheny Ludlum Steel Corp., Pittsburgh, he was later sales engineer, Pittsburgh Steel Foundry, Glassport, Pa.

**Peter Iaffaldano** was named a field engineer in the Cleveland district office, Norton Co., Worcester, Mass. He joined the company a year ago. Previously he was associated with General Motors Corp., at Syracuse, N. Y., and Elyria, O.

● **Arthur L. LaMasters** recently joined Michigan Industries Co., Detroit, subsidiary of Consolidated

● FREDERIC S. CLAGHORN
*. . . division sales mgr.*

● GEORGE H. POWERS
*. . . assistant sales mgr.*

● WILLIAM F. WINEMILLER
*. . . sales department mgr.*

● ARTHUR L. LaMASTERS
*. . . joins Michigan Industries*

QUALITY
for over 100 years

## To Meet the Demands of Your Changing
# CORE ROOM PROBLEMS

### AND NOW!!!
# TAILOR-MADE CORE OILS
### *to meet your most exacting requirements*

You can depend upon this very comprehensive line of core oils to give excellent performance in the majority of your core work. Occasionally very exacting requirements will call for a special core oil. Our technical and field staff will gladly work with you to develop an oil to answer your particular problem.

### JET BOND D & P SERIES CORE OIL

A series of fast baking core oil, producing cores with high tensile and hot strength and excellent collapsibility. You can depend on any one of the oils from the JET BOND SERIES to produce cores with smooth, hard surfaces, strong sharp edges, resulting in HIGHER QUALITY CASTINGS.

### JET LIQUID RESIN SERIES

A series of compounded liquid resins, producing cores with exceptionally high tensile strength and fast baking properties. The JET LIQUID RESIN SERIES will prove exceptionally valuable in the large production foundries by eliminating core room bottle-necks, along with increased core room production. It will also step up baking time considerably on the large chunk cores where baking is generally a problem.

### TYKOR LIQUID CORE COMPOUND

A concentrated liquid core compound, generally used in conjunction with core oil, to increase the surface hardness of cores, and, at the same time, produce softer centers. Tykor has been proven particularly valuable especially where shrinkage cracks are a problem, generally caused by poor collapsibility.

### JET DRI-BINDER

A heavy duty dry core binder recommended for steel and gray iron castings, particularly where metal erosion and metal penetration is a problem. JET DRI-BINDER users report cleaning costs reduced considerably, very low scrap and better casting finish.

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- JET $CO_2$ BOND Series silicate binders
- JET $CO_2$ BOND Stabilizer
- Super Jet Drier
- Jet Liquid Parting
- Jet Sand Conditioner
- Jet Resin A

Working samples and literature on Swan-Finch Foundry Products will be sent to you on request for test purposes in your own foundry. A qualified Swan-Finch engineer will gladly help you select one of our foundry products for your particular requirements.

## MEN OF INDUSTRY

● W. BASIL LEACH
*. . . Mexico Refractories pres.*

● JAMES B. SMITH
*. . . becomes chief engineer*

● ROBERT J. MILLER
*. . . joins Fred W. Fuller Co.*

● ALEXANDER N. McFARLANE
*. . . Corn Products Sales pres.*

Foundries & Mfg. Corp., Chicago, as vice president with functional responsibilities for sales and sales policies affecting the company's alloy foundry and fabrication activities. Until recently Mr. LaMasters was vice president, Alloy Engineering & Casting Co., Champaign, Ill. He is chairman of the Peoria Chapter of the American Society for Metals.

● **W. Basil Leach** has been elected president, Mexico Refractories Co., Mexico, Mo., succeeding its founder, **John B. Arthur,** who has become chairman of the board and chief executive officer. Mr. Leach, formerly vice president-director of sales, has been with the company since its organization in 1929. **C. A. Smith** has been made executive vice president, continuing as chief engineer. **Carl H. Bachmann,** production manager, was elected a vice president. **Roger A. Hitchins,** vice president-general manager of the company's National Refractories Division, and **P. J. Geib,** assistant treasurer, both of the Philadelphia office, were elected directors.

**William V. Cross** was named manager of sales development, Ion Exchange Division, National Aluminate Corp., Chicago, where he will be active in marketing of binding agents for investment casting and mold release agents for die casting and plastic molding operations. He was formerly eastern district manager of the Industrial Sales Division.

**Frederick C. Hammer** was appointed public relations director, Central Foundry Division, General Motors Corp., Saginaw, Mich. He joined the Saginaw Malleable Iron plant in 1950, and was previously engaged in personnel, employee relations and editorial work with the division.

● **James B. Smith,** who recently joined Alloy Precision Castings Co., Cleveland, has been appointed chief engineer for the company. A graduate of University of Alabama, Mr. Smith was previously associated with Aluminum Co. of America, Pittsburgh, Sperry Gyroscope Co., Great Neck, N. Y., and Republic Aviation Corp., Farmingdale, N. Y. **Theodore E. Hart** has been named secretary-treasurer of Alloy Precision Castings Co. A graduate of Ohio State University, he joined the company in 1953, and was formerly assistant secretary-assistant treasurer.

● **Robert J. Miller,** for the past 5 years in the quality control department, Cleveland Foundry, Ford Motor Co., Berea, O., recently joined the Fred W. Fuller Co., manufacturers' representative, Cleveland. Mr. Miller will be in charge of the southern Ohio district of the company, with headquarters in Cincinnati.

**N. George Belury,** vice president, American Brake Shoe Co., New York, was named president of the Engineered Castings Division, organized recently to integrate its foundries and co-ordinate sales. **Harry C. Platt** was made vice president-operations, and **Philip H. Clapp,** vice president-sales. **Thomas J. Wood** is operations assistant to Mr. Belury, and **Raymond Keith** is comptroller. **Raymond Martinson** will supervise plants at Mahway, N. J., Melrose Park, Ill., and South San Francisco. **Duncan Wilson** will oversee the Rochester and Medina, N. Y., plants. **Edward Hogan** is in charge of New York area sales, **S. Whitney Dickey,** Chicago, **Jack Goheen,** the West Coast area, and **Philip O'Reilly,** Rochester. **Harry J. South** and **Richard Pinto** were named product managers.

● **Alexander N. McFarlane,** vice president-general sales manager, Corn Products Refining Co., New York, was elected president, Corn Products Sales Co., succeeding **William H. Gamble,** who has been named senior vice president of Corn Products Refining Co., the parent company.

**W. Adrian King** was appointed general sales manager, Industrial Chemicals Division, Olin Mathieson Chemical Corp., Baltimore. **James C. Laney** succeeds Mr. King as manager of the automotive products department. **James F. Newell** was named assistant general manager of the division, and **Charles C. Hightower,** manager of the products department. **W. Carlton Moseley** was named manager of the company's Lake Charles, La., plant. **Cecil L. Williamson** was appointed assistant to the division general manager in Baltimore.

**Wallace E. Carroll,** president-treasurer, American Gage & Machine Co., Chicago, is the new director of the Metalworking Equipment Division, Business and Defense Services Administration, Department of Commerce, Washington. Mr. Carroll succeeds **J. Robert Jones,** vice president-sales, Kearney & Trecker Corp., Milwaukee, who has served since September.

**Raymond Boyd Jr.** was named manager of the Industrial Divisions and Foreign Operations, U. S. Hoffman Machinery Corp., New York. **Lewis S. List** has succeeded Mr. Boyd as manager of the air appliance department of the Industrial Divisions. A graduate of Brown University, Mr. Boyd joined the company in 1946. Mr. List has been a junior engineer with U. S. Hoffman since 1950.

# 'DEPENDABLE'

# SHELL CORE MACHINE

**LOW Initial Cost . . .**
**ECONOMICAL Production . . .**
**EASE of Operation . . .**

***Brings shell core molding within reach of* every foundry.**

Engineered with foundry "know how" — the DEPENDABLE Shell Core Machine produces shell cores known for: Unexcelled Permeability . . . Collapsibility . . . Accuracy . . . Easy Shake-Out . . . and are used, not only in shell molds, but also in the regular greensand foundry and in permanent molds.

DEPENDABLE is a rugged, precision machine — engineered to give years of trouble-free service. All working parts are high grade castings, accurately machined. Ball bearing rollers make for easy carriage operation. Bronze hex-head bushings permit accurate core box matching.

1. "Quick Change" for short runs.
2. Core boxes can be used with little or no alteration.
3. Produces intricate small cores in four gang boxes at the rate of ten per minute, and cores up to 9" diameters or 18" lengths at the rate of one per minute.
4. Low Fuel Cost—Either natural, manufactured or bottled gas can be used with heat applied directly to the core box.
5. Various thicknesses of core can be obtained by length of time invested.
6. Eliminates the need for driers or pasting.

Price **$994.00,** F. O. B. Portland, Oregon
Shipping Weight, crated, 400 lbs.
Completely equipped with all valves and controls.
Easily installed.

**DEPENDABLE**
**PATTERN WORKS**
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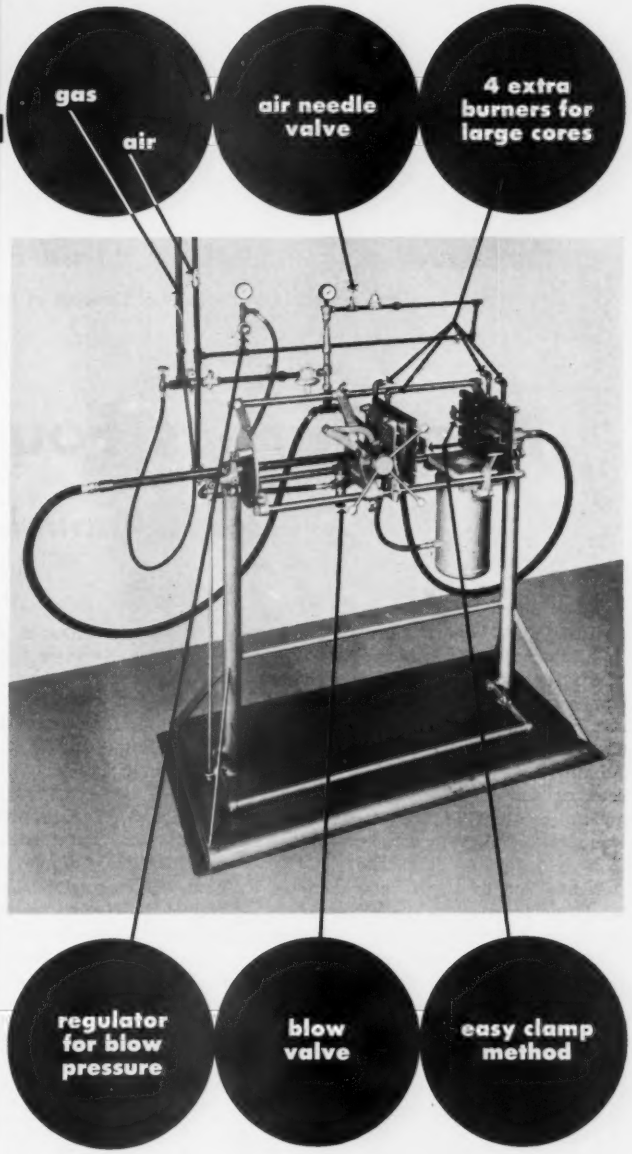


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Frederic B. Stevens
Detroit 16, Michigan

Pennsylvania Foundry Supply and Sand Co.
Philadelphia 24, Penna.

Snyder Foundry Sup. Co.
Los Angeles 58, Calif.

Harold E. Pridmore
Palo Alto Calif.

LaGrande Ind. Supply
Portland 1, Oregon


*Circle 632 on Inquiry Card—Page 51*

Speakers table at the annual banquet of the Non-Ferrous Founders' Society

# Non-Ferrous Founders' Society

## *Holds Annual Meeting*

By WILLIAM G. GUDE
*Managing Editor*

BUSINESS conditions are favorable, and indications are that they will continue that way. This view was expressed by William A. Meissner Jr., deputy director, Copper Division, Business and Defense Services Administration, Washington, in addressing one of the sessions at the annual meeting of the Non-Ferrous Founders' Society in Cincinnati, May 9.

In addition to a government-industry luncheon session, the program included a banquet and the society's annual business meeting. In the election of officers and directors, Charles J. Egetter, president, Crown Brass Mfg. Co., Alhambra, Calif., was chosen president to succeed Edward J. Metzger, president, Multi-Cast Corp., Wauseon, Ohio.

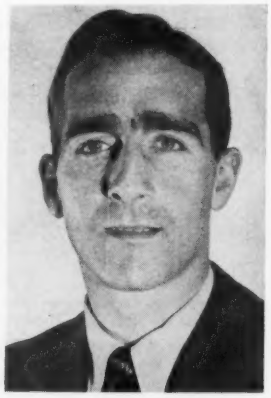
Phillip E. Lankford, East Birmingham Bronze Foundry Co., Birmingham, was named first vice president, and M. E. Nevins, president, Wisconsin Centrifugal Foundry Co., Waukesha, Wis., was elected second vice president. Herbert F. Scobie and Mrs. D. D. McDermott continue as secretary-treasurer and assistant secretary-treasurer, respectively.

Newly elected directors are: Elmer Brumund, Brumund Foundry Co., Chicago; George W. Stewart, East Bay Brass Foundry, Richmond, Calif., and Richard T. Stanton, Aluminum Foundry Co., Cincinnati. S. Oscar Swangren, Dorchester Brass & Aluminum Foundry, Hyde Park, Mass., was re-elected a director.

In discussing business conditions, Mr. Meissner pointed out that first

CHARLES J. EGETTER
*President*

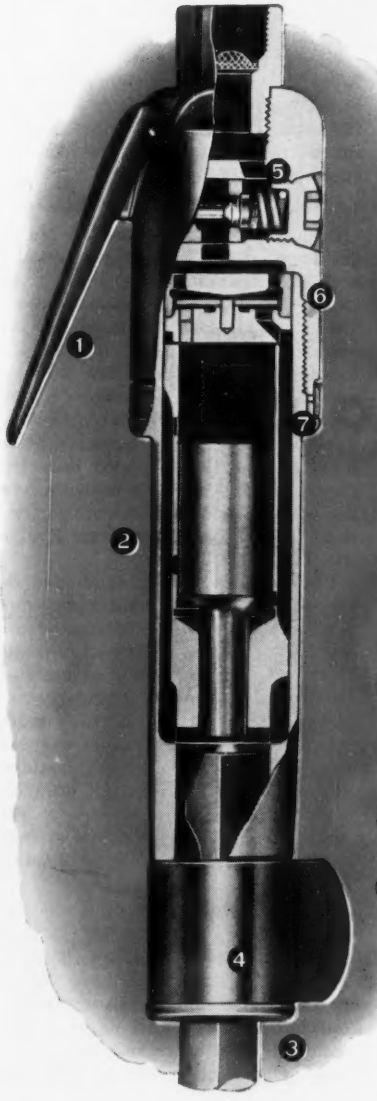
P. E. LANKFORD
*First Vice President*



M. E. NEVINS
*Second Vice President*

*Power and speed without bulk and weight*

# THOR AIR WELD FLUX SCALERS




**AND HERE ARE 7 GOOD REASONS TO USE THEM**

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2. Barrel is made in two separate pieces—easily replaceable
3. Square nozzle permits using chisel edge on any surface or contour
4. Quick change retainer—rapid change of chisel permitted
5. Easily serviced, self seating, spring throttle valve
6. Trouble free rocker plate
7. Positive throttle lock

Thor weld flux scaler makes fast work of removing excess material on frame weld.

Removing weld flux and splatter is no chore at all for Thor's versatile scaling hammer. It's small, lightweight—handy enough for one hand operation in those tight corners.

Useful too, for paint scraping, rust removal, wood chiseling, and removing cores from light castings.

Ask your Thor industrial distributor for a free demonstration. Thor Power Tool Co., Prudential Plaza, Chicago 1, Illinois.

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look beyond the price . . .

you'll see that you get the most for your money in

MATHEWS CONVEYERS

Overhead trolley conveyer with transverse bends handles finished castings in this modern foundry.

Most plant operating people, when they buy conveying systems, are looking for the equipment that is best for their plant—equipment that is designed to meet their individual requirements. They are looking beyond the price . . . looking to quality—to dependability. Mathews engineers have been designing and building conveying systems for over 50 years, and a great amount of this equipment has been applied in foundries. This is why operating people everywhere have an extra measure of confidence in Mathews equipment—and why you see Mathews Conveyers in foundries everywhere.

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MATHEWS

(Member Foundry Equipment Manufacturers Association)

quarter results for a number of leading indexes were in line with forecasts for 1957 as a whole. The decline in home building has had an adverse effect on demand for nonferrous castings, but nonresidential construction is 7 per cent more active than a year ago. First quarter shipments of copper-base castings are estimated at slightly ahead of those of the preceding quarter.

Copper is in ample supply at prices well below the 1956 peak, and with copper scrap also in easy supply, Mr. Meissner said the government has not been able to justify the continuation of quotas existing the last several years on scrap exports. Exports of both copper and copper scrap were open-ended starting April 1. Meanwhile, he said, imports of brass and bronze products are increasing. It is estimated that the dollar volume of castings imported in 1956 was $1,837,000, against $891,000 in 1955. United States exports of all goods last year of $18 billion exceeded imports by $4 billion.

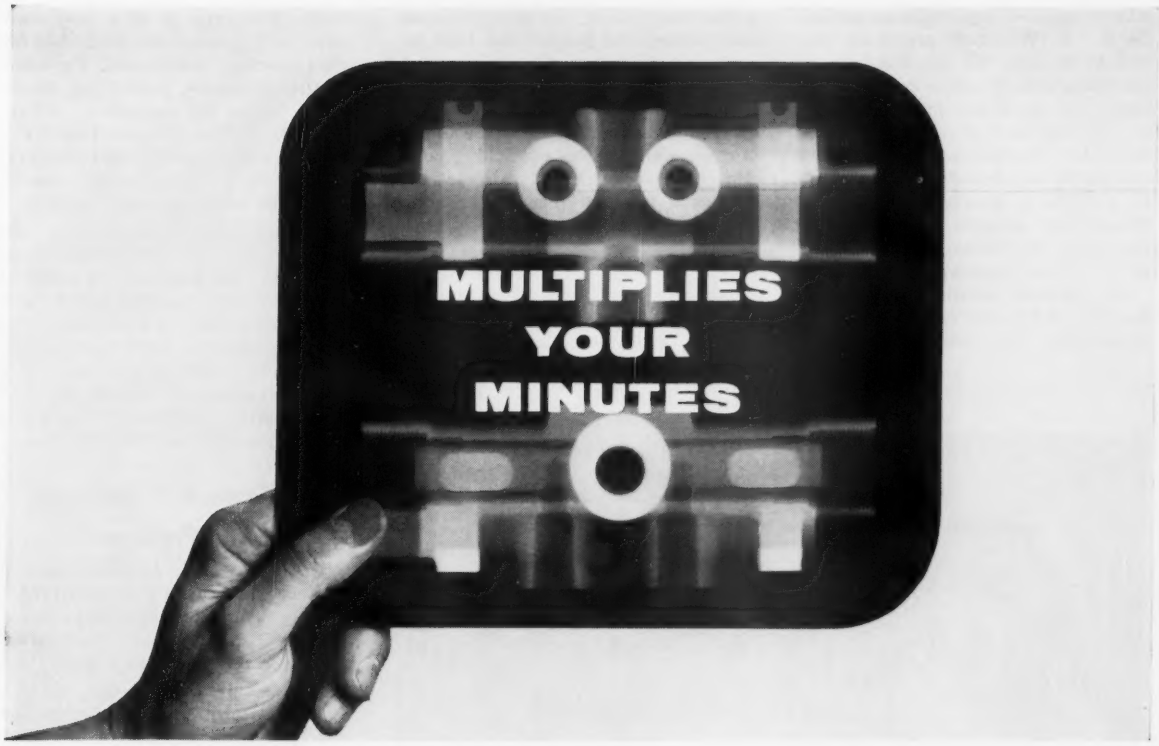
Manley Brooks, deputy director, Aluminum and Magnesium Division, BDSA, while on leave from Dow Chemical Co., spoke briefly on the functions and services provided to business by the agency.

**Society Adds Twenty Members**

Society president Edward J. Metzger, in reporting on the organization's activities, announced the addition of twenty new members during the year. The society plans to issue special reports on subjects of interest to members: it also has plans for improving the society's publication, for compiling a speakers list and film directory, for more regional meetings, and for an expanded publicity program. The society's headquarters are being moved from downtown Chicago to the University Bldg., Evanston, Ill., about June 1.

Results of a survey conducted by the society among consumers were reported on by M. E. Nevins, chairman of the Standardization and Product Development Committee. This study showed, among other things, that quality is given much greater consideration than service or price when buyers order castings. This committee currently is studying ways to reduce the number of different common alloys offered in castings, in order to cut inventories of metal that foundries must carry.

Discussing "What To Do About Rising Costs," a number of practical suggestions were offered by William A. Gluntz Brass & Aluminum Foundry Co., Cleveland, and Cost Committee chairman. These recommendations included: 1) Understand the job before quoting on it and be sure that




# New Kodak Industrial X-ray Film, Type AA

When you're faced with the need for quantities of high-quality work, Kodak's new Industrial X-ray Film can be an outstanding find.

Because of its greatly increased speed, exposure times can be cut, and more production realized with existing x-ray equipment and gamma ray sources.

While this new film ranges up to more than twice as fast, it still has the fine sensitivity characteristics which made Kodak Type A the most widely used x-ray film in industry.

Kodak Industrial X-ray Film, Type AA, extends the service of present radiographic equipment, saves time, produces quality results. Have your x-ray dealer or Kodak Technical Representative show you how.

EASTMAN KODAK COMPANY
X-ray Division Rochester 4, N. Y.

**Read what the new Kodak Industrial X-ray Film, Type AA, does for you:**

- Reduces exposure time—speeds up routine examinations.
- Provides increased radiographic sensitivity through higher densities with established exposure and processing technics.
- Gives greater subject contrast, more detail and easier readability when established exposure times are used with reduced kilovoltage.
- Shortens processing cycle with existing exposure technics.
- Reduces the possibility of pressure desensitization under the usual shop conditions of use.

Kodak
TRADE-MARK

proper facilities are available to handle it. 2) Wherever practical, plan how to produce the job and have an adequate idea of costs involved. 3) Check to see if the production plan is followed and if costs meet the estimate. 4) Provide adequate skill, equipment and supervison on the job. 5) Provide a quarterly or monthly budget for expenses and check it regularly. 6) Reward workers in relation to their accomplishments.

Mr. Gluntz detailed the various factors which influence costs, and emphasized the need for revising prices to reflect changes in these cost items. He pointed out that because of the effect of metal loss, administrative and selling costs and profit, a 1-cent change in the price of metal actually should result in a change of 1.29-cents in selling price. He also demonstrated in a hypothetical case how an increase in scrap rate from 5 per cent to 7½ per cent will reduce the profit by 15 per cent.

Whether or not the foundry should mechanize depends on several factors, according to A. E. Jacobsen, Grand Haven Brass Foundry, Grand Haven, Mich. The type of shop and character and volume of work handled are important influences. Frequently the increased production anticipated with mechanization is not realized, he said, but the benefits of reduced manual effort and improved working conditions generally are reflected in better product quality.

A well attended reception and banquet at the Netherland-Hilton concluded the meeting. Edward J. Metzger presided and introduced newly elected officers and directors. The principal speaker, Fred Smith, president, Fred Smith Associates, Cincinnati, gave a talk under the title "Responsibility of Privilege" that was both interesting and inspirational.

Impact cleaning, preparing surfaces for finishing, removing scale, or for any other blast cleaning or peening problem . . . The Cleveland Metal Abrasive Company has the right shot or grit for you.

Years of research and development have been carried on by The Cleveland Metal Abrasive Company to insure consistently high quality and uniformity for our customers.

For the finest quality in shot or grit at the lowest possible cost, use Cleveland . . .

Ask us particularly about Toledo Realsteel*, now being produced in volume in our new Toledo plant.

***Write for our new catalog today!***

**The CLEVELAND METAL ABRASIVE Co.**
**800 East 67th St., Cleveland 8, Ohio**
**Howell Works: Howell, Michigan**
**Toledo Steel Shot Division: Toledo, Ohio**

One of the world's largest producers of quality shot and grit—Hard Iron—Malleable (Normalized*) —Cut Wire—Cast Steel (Realsteel*).

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## ASME Group Will Deal with Maintenance Problems

A new group to deal with complex engineering problems encountered in keeping industrial equipment in operating condition has been formed by the American Society of Mechanical Engineers.

The unit will cover such topics as modification of equipment and facilities to reduce or eliminate maintenance problems, prescription of corrective measures—including the development and use of special instruments—and managerial activities such as organization, planning and keeping of records.

As part of its program, the group will sponsor technical papers to be presented at national meetings of ASME and may in the future sponsor conferences in various parts of the country to consider special maintenance problems. First technical papers under its sponsorship are expected to be presented at the semi-annual meeting of the society at San Francisco in June.

"As a token of appreciation for your many . . . er . . . helpful comments—the boys purchased a little gift."

How can we improve our electrode operating practices?
Let's call Great Lakes Carbon—they've always been helpful, and their product performance is outstanding!

ELECTRODE GLC DIVISION

**GREAT LAKES CARBON CORPORATION**

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## What To Look for in .....

# USED LIFT TRUCKS

Used lift trucks can be a good investment or a source of trouble, depending on the care with which they are selected

By R. F. MOODY
Hyster Co.
Portland, Oreg.

SIZABLE numbers of used lift trucks are being purchased by the foundry industry. They can be a good investment or a source of trouble, depending on the care with which they are selected. Here is a 19-point checklist that will help operators to get the right truck for their jobs.

When a used lift truck is considered for purchase, both its basic specifications and its operating condition should be analyzed carefully. A reputable dealer will provide valuable assistance, but in most instances the potential customer knows his requirements far better than any outsider. Buying a used lift truck is not like buying a secondhand car. With a car, almost any model of any make is available in the immediate vicinity of a prospective buyer. But lift trucks are made in substantially fewer numbers than automobiles, and each truck must be matched against how and where it is to be used. In addition, a lift truck is a piece of capital equipment. If it breaks down, more than inconvenience results: Production schedules are disrupted, time is lost and operating costs mount.

**Why Buy Secondhand Equipment?**—Why should a used truck be considered at all since new equipment obviously is safer and more reliable and has refinements unavailable in used models, even of recent vintage?

Of the numerous reasons, one is most important: Lower first cost. The amount that can be saved by purchasing secondhand equipment depends entirely on the individual

### Condition Checklist for Used Lift Trucks

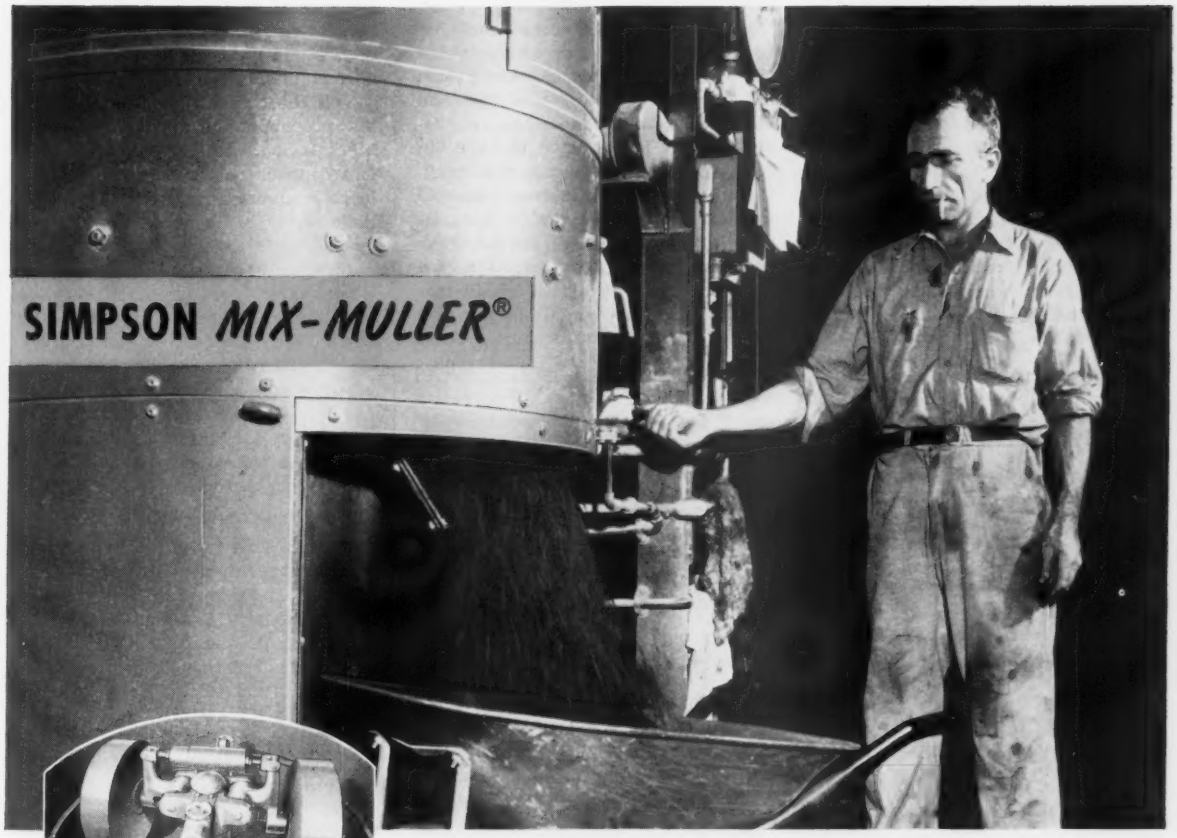
**VISUAL INSPECTION**

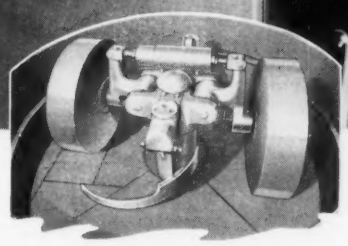
**General Appearance:** Good _____ Bad _____
Paint : Good _____ Bad _____
Fenders: Damaged _____ Good Condition _____
Guards : Damaged _____ Good Condition _____
Other : _____

**Uprights:**
Condition: Good____ Repaired____ Damaged____ Rollers____ Slides____
**Chains:** Drive Chains____ Sprockets____ Hoist Chain(s)____
**Frame:**
Condition: Out of Line____ Welded____ Repaired____ Needs Repair____ Good____
**Tires:**
Type: _____
Condition: Load (Front) _____ Steering (Rear)_____

**OPERATIONAL INSPECTION**

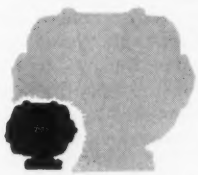
**Engine:**
Make____ Model____ Serial____ Number of Cylinders____
Condition: Good____ Bad____ Smoking____ Noisy____ Knocking____
Needs: Replacing____ Overhauling____ Minor Adjustment____ Nothing____
**Clutch:**
Condition: Slips____ Grabs____ Needs Replacing____ Needs Adjustment____
**Transmission:**
Operated in each of these speeds Forward: 1____ 2____ 3____ 4____ 5____
Operated in each of these speeds Reverse : 1____ 2____ 3____ 4____ 5____
Condition: Noisy____ Good____ Needs Adjustment____ Needs Replacement____
**Differential:**
Condition: Noisy____ Good____ Needs Adjustment____ Needs Replacement____
**Hydraulic System:**
Hoist Cylinder: Leaking____ Good____ Needs Repacking____ Bad____
Tilt Cylinder(s): Leaking____ Good____ Needs Repacking____ Damaged____
**Pump:** Good____ Noisy____ Leaking____ Slow Acting____
**Valves:** Good____ Leaking____
**Steering:**
Condition: Play in Wheels____ Hard to Steer____ Damaged____ Repaired____ Good____
**Electrical System:**
Battery: Good _____ Needs Replacement_____
Starting Motor: Good _____ Slow_____ Spark_____
Generator: Good_____ Sparks_____ Needs Brushes_____
Lights: Operative _____ Inoperative_____
Wiring: Good _____ Frayed_____
**Miscellaneous:**
Radiator: Good_____ Leaks_____ Overheats_____
Horn: Operative _____ Inoperative_____
Instruments: Operative_____ Inoperative_____



**THESE FEATURES**
***make sense to foundry men:***

***LOW POWER REQUIREMENTS***



Stationary pan principle brings mulling action *to the sand mass*. Power used—is used to mix sand.

***EASE OF MAINTENANCE***

Simple, rugged design makes Simpson Mix-Muller safe and easy to operate, *understand*, and maintain.

***UNIFORM CONTROLLED MIXING***

An *intensive* muller, the Mix-Muller provides thorough dispersion, even tempering for any and all types of sand used in the foundry, including $CO_2$.

## BOTTOM DISCHARGE

### empties pan quickly, thoroughly, automatically

• To discharge any model of the Simpson Mix-Muller all you do is open a door in the bottom of the pan. The mixer is emptied quickly, (up to 4,000 lbs. in 20 seconds) and *thoroughly* by plow action. No extra power is needed to elevate the sand.

Simplicity is inherent in the design of the Simpson Mix-Muller. *Any* machine that pays off in a foundry operation must be rugged, easy to clean . . . easy to *get at* for routine maintenance and lubrication. Simpson Mix-Mullers have been filling these basic requirements for over 45 years. The newer F Series Models provide centralized lubrication, V-belt drive; a removable crib section for easy access combined with the most thorough, controlled mulling action ever developed!

They are described in Bulletin 511 and are available now in a range of sizes from 50 to 4,000 lbs. batch capacity. Write for details today.

Mixing and the integration of mixing equipment—is our business.

**NATIONAL Engineering Company**
646 Machinery Hall Bldg.,
Chicago 6, Illinois



Circle 638 on Inquiry Card—Page 51

truck. Generally, used trucks are offered under one of two conditions, "as is" or "rebuilt." Actually, some manufacturers, such as Hyster Co., suggest three basic categories for used lift truck equipment—"as is," "good value" or "high-quality." The "high-quality" tag is restricted to trucks that are rebuilt to factory standards and warranted for a fixed period of time. The "good value" tag is applied to a truck that has been put in first-class operating condition, but not necessarily completely rebuilt. The "as is" truck is in the same condition it was when traded.

Most dealers do some work on trucks more than four or five years old. If the secondhand truck you are considering is of this age and has been reconditioned, but not rebuilt, it can be expected to have 60-70 per cent of the life of a new truck. If it is only three to four year old and properly reconditioned, but not necessarily rebuilt, it should have 75-85 per cent of the useful life of a new truck. The life of a rebuilt machine should approximate 90 per cent of the life of a new machine. These are general figures and apply to the mechanical condition of a truck operated under normal conditions with normal maintenance.

Yet, the cost of used equipment is not proportionate to its anticipated life. It is less. Again, how much less depends on the machine and on local circumstances. It may be as little as 30 per cent or as much as 70 per cent.

Naturally, savings are important when capital is limited; therefore used trucks often are purchased by small manufacturers or distributors. They allow them to mechanize operations and save approximately the same amount of time and money as with new equipment. Many used truck purchasers never have owned a lift truck before.

**Used Truck Makes Good Standby**

Larger companies also frequently buy used equipment to supplement existing fleets during peak production periods. Since a used truck costs less, the depreciation that must be charged against it as overhead when it is not working is much less than with a new machine. A used truck therefore frequently provides a good answer to the "standby" equipment problem.

Still another reason for buying a used lift truck is to fulfill production requirements while waiting on new equipment. In today's market, delivery of some models of lift trucks, particularly those requiring a large amount of special engineering, are available only on several month's delivery. Utilizing a secondhand truck to meet immediate production demands often is the most economical solution to this problem.

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The Miller Multi-Arc combination ac-dc welder, built specifically for metallic arc welding, delivers either ac or dc current at the flick of a switch. Electrical control circuit eliminates mechanical controls. Primary switch is standard equipment; Power Factor Correction optional. Six models from 10 to 525 amperes—all with 60% duty cycle ratings.

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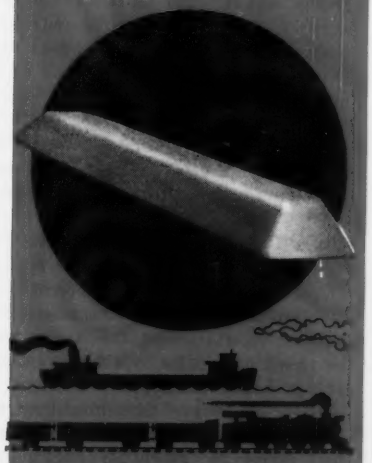

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The amount of underclearance affects the areas in which a truck can be used. Here there are two requirements—namely, underclearance under the uprights and under the center of the frame. Too little clearance may cause the truck to "hang-up" on ramps or in yards.

Floor loading is important, particularly in older plants; so the total weight of the truck with and without load should be considered. There actually is no way of quickly determining the structural capacity of an old building other than to refer to construction prints or to make an engineering survey.

### Weight Distribution Is Vital

The determining factor is, of course, not total weight, but its distribution. A four-wheeled machine with pneumatic tires distributes weight and load over more floor area than a similar machine with solid or cushion tires, for example. If the truck is to be used in an elevator, weight alone is the dominant characteristic, whereas if the vehicle will operate inside a trailer, both weight and floor loading are important.

Finally, the type of tires on the truck govern to a large extent where it can be used. Solid-tired machines, for example, are not adaptable to outdoor use. Pneumatic-tired machines can be used either in or outdoors. So can a solid-cushion machine, but to a lesser extent.

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**How to Determine Truck Condition**—Over and above the factor of ability to meet a given requirement is mechanical condition. Many points should be checked here, perhaps the most important being that the purchaser buy from a reputable dealer.

If the truck has been reconditioned and is warranted, used parts obviously are available. If, however, it is offered in the "as is" condition, the prospective buyer should determine whether replacement parts can be obtained. Depending on the manufacturer, service parts generally are available for machines from 10 to 20 years old, but they may not be available from stock.

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truck. Generally, used trucks are offered under one of two conditions, "as is" or "rebuilt." Actually, some manufacturers, such as Hyster Co., suggest three basic categories for used lift truck equipment—"as is," "good value" or "high-quality." The "high-quality" tag is restricted to trucks that are rebuilt to factory standards and warranted for a fixed period of time. The "good value" tag is applied to a truck that has been put in first-class operating condition, but not necessarily completely rebuilt. The "as is" truck is in the same condition it was when traded.

Most dealers do some work on trucks more than four or five years old. If the secondhand truck you are considering is of this age and has been reconditioned, but not rebuilt, it can be expected to have 60-70 per cent of the life of a new truck. If it is only three to four year old and properly reconditioned, but not necessarily rebuilt, it should have 75-85 per cent of the useful life of a new truck. The life of a rebuilt machine should approximate 90 per cent of the life of a new machine. These are general figures and apply to the mechanical condition of a truck operated under normal conditions with normal maintenance.

Yet, the cost of used equipment is not proportionate to its anticipated life. It is less. Again, how much less depends on the machine and on local circumstances. It may be as little as 30 per cent or as much as 70 per cent.

Naturally, savings are important when capital is limited; therefore used trucks often are purchased by small manufacturers or distributors. They allow them to mechanize operations and save approximately the same amount of time and money as with new equipment. Many used truck purchasers never have owned a lift truck before.

**Used Truck Makes Good Standby**

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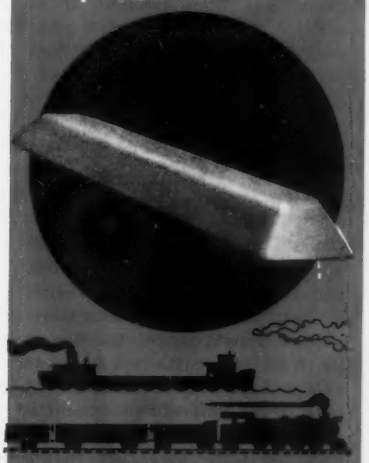

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important consideration. Like many other industries, the fork truck industry has consolidated, and some early trucks no longer are on the market. A used truck with an obsolete name is a poor buy.

A rebuilt truck is, of course, usually in better condition than one that is offered "as is." Generally, it has been steam-cleaned and painted; the frame has been repaired if necessary; it has a new clutch and new brake lining; the engine has been rebuilt; the hydraulic system has been overhauled; wheel bearings have been checked and packed; tires are in good condition, and other components have been checked and repaired. In some instances, however, an "as is" truck is an excellent buy; unusual circumstances may have required the former owner to trade it in. If his name can be determined, he can be asked. Otherwise, the general reputation of the dealer can be relied upon. He is a businessman and probably has hopes of selling the used truck buyer new machines at some future date. He wants a satisfied buyer as much as the buyer wants a good used truck.

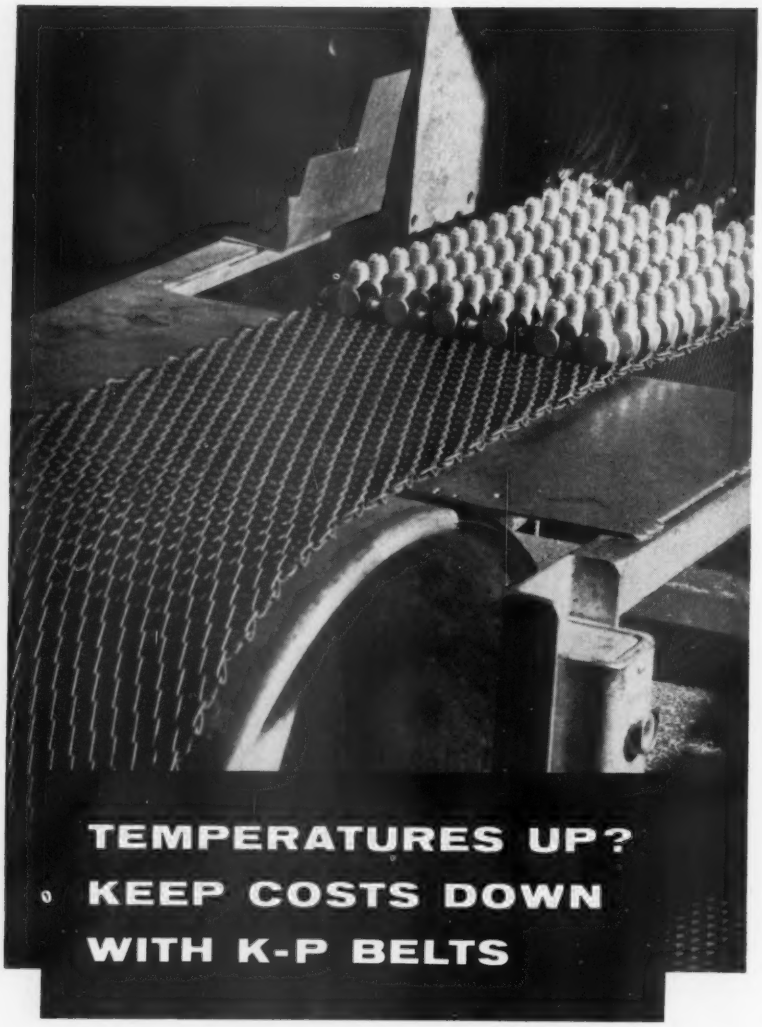
**Attachments Are Plus Value**

Most used trucks do not come equipped with attachments other than forks, but such a machine may have attachments which, if they can be used, are a "plus" in the sale.

However, the buyer who purchases a used truck with the idea of fitting a new hydraulic attachment to it sometimes is faced with a costly or possibly insurmountable problem. Current attachments may not be adaptable to obsolete trucks. Thus, a cautious approach is recommended in the purchase of a used machine to which a new hydraulic attachment is to be fitted. With mechanical attachments, the problem usually is much simpler.

A visual check of the truck obviously is wise. Unless the prospective buyer knows the dealer well, it is wise to look at the truck in question rather than merely at a picture. Its general appearance, cleanliness, and absence or presence of waste, dirt, and grease is a good indication of how well the truck has been maintained.

Mechanical condition is, of course, very important. Among other things that the buyer will want to check are the action of the clutch pedal to determine whether it has the proper amount of "free pedal travel"; too much may indicate a worn clutch. The steering column should be checked for play. If the truck is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Circle 641 on Inquiry Card—Page 51

equipped with power steering, the operation should be checked without a load on the forks—generally the most severe condition.

The truck should, of course, be driven and the condition of the brakes determined. Driving it over rough ground will shake off any loose parts and indicate serious structural defects. Driving it up a grade to see whether the engine maintains power is recommended, and, during tryout, the prospective buyer should drive it through each gear ratio to determine the condition of the transmission.

When the truck is driven, the operator should speed it up and decelerate it abruptly to determine whether there is play in the gears. Alternate deceleration and acceleration will cause a "clunk" if the transmission is in poor condition.

The truck should be checked under load to make sure that the lift mechanism works properly and that it will support the rated load. The tilt mechanism should be checked at the same time. Running the truck through the lift and tilt cycle will indicate whether the relief valve is kicking out properly at the end of the tilt or lift cycle and whether there is wear in the valves or packing. A good approach is to make this test on a clean surface or on a piece of kraft paper to show up oil leakage.

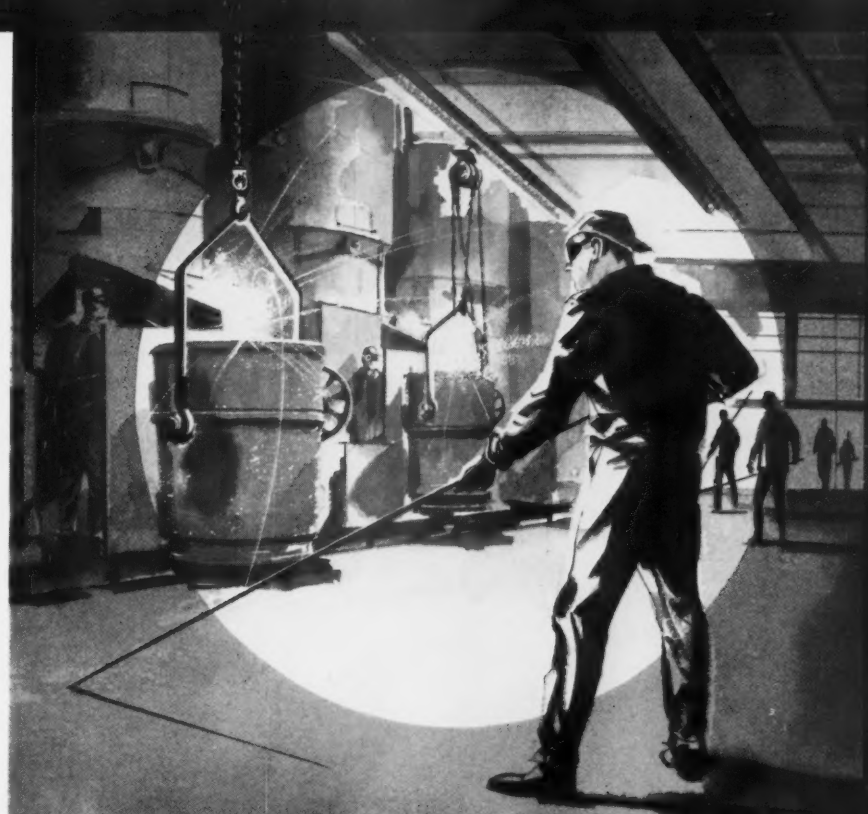
**Analyze Engine Operation**

Operation of the engine should be analyzed by several means. One is to use a compression gage, which will indicate valve leakage or worn or cracked rings. Putting a vacuum gage on the engine intake manifold also will indicate the condition of the valves. A simple check can be made by removing the oil "dip stick" and visually inspecting the condition of the oil.

Allowing the truck to idle for 15 to 20 minutes also is a wise precaution. If it overheats, the cooling system may be defective. At the same time, the water in the radiator should be checked for rust and scale, the hose should be inspected for cracks, and all connections should be visually inspected for stains that would indicate leakage.

Speed of the lift indicates the condition of the hydraulic system. If the hoist cylinder rises slowly, the pump may be worn. Likewise, if the hydraulic fluid becomes hot, the pump may be in bad condition. Above all, it is wise to make sure that the lift and tilt cylinders are not scored and that the flexible connections in



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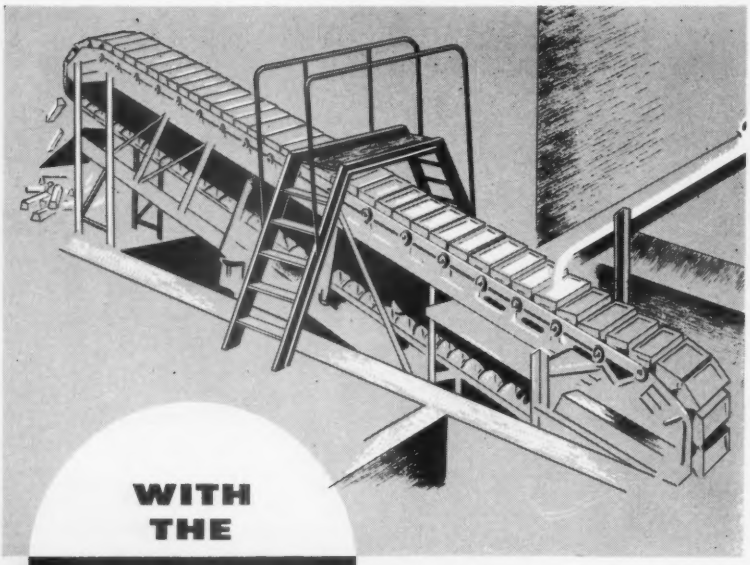
*Circle 642 on Inquiry Card—Page 51*

# Simplify Pig Casting Operations . . .



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The unique "stationary wheel" design greatly increases service life and pig casting economy for foundries and small metal producing plants. With this design the roller bearing idler wheels are mounted on the frame rather than on the moulds— thus keeping them far as possible away from hot metal.

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the hydraulic system do not show signs of wear.

Condition of the uprights is important since they support the load. If damaged or bent, they may not be capable of supporting the rated load of the machine. This point should be determined. So should the condition of the load and side rollers; excessive side play indicates replacement. All bushings and bearings should be checked, particularly those that act as pivot points. The condition of the steering spindles can be determined by seeing whether they are worn and still in one piece or whether they are ball or roller bearing types to determine whether any balls are missing from the races.

The electrical system—particularly generator, battery, and distributor—should be inspected visually. Starting the engine will indicate the condition of the starting motor. If it kicks over fast, the starting motor probably is in good condition; if it turns the engine over slowly, it may have to be reconditioned, or the battery may have to be replaced.

It is easy to take the bank off the generator to determine whether the brushes are sparking, just as it is to check for frayed or worn wiring. A visual check of the battery may indicate its condition.

**Condition of Tires Is Important**

The condition of the truck tires is important; tires are expensive. If the sidewalls are badly notched or bruised, new tires may be required. If the tread is worn thin and the tires have not been recapped previously—this can be determined by looking for separations along the outer rim—recapping may solve the problem. Actually, an industrial truck pneumatic tire can be recapped several times.

Solid cushion tires present another problem. Badly worn units cannot be recapped; they must be replaced. But tread is no indication since there is little tread on a solid cushion tire to begin with. Points to check are the thickness of the tires, the condition of the bond between the rubber and the wheels, and absence or presence of "chunked-out" sections.

Equally important is the type of tread on the tires and the size of tires with which the truck is fitted.

**Close Checks Pay Off** — All this sounds complicated, but it sounds more complicated than it is. Any energy that the prospective buyer expends to make sure that he is getting the truck that he wants, in the operating condition he wants, is well worth the investment.



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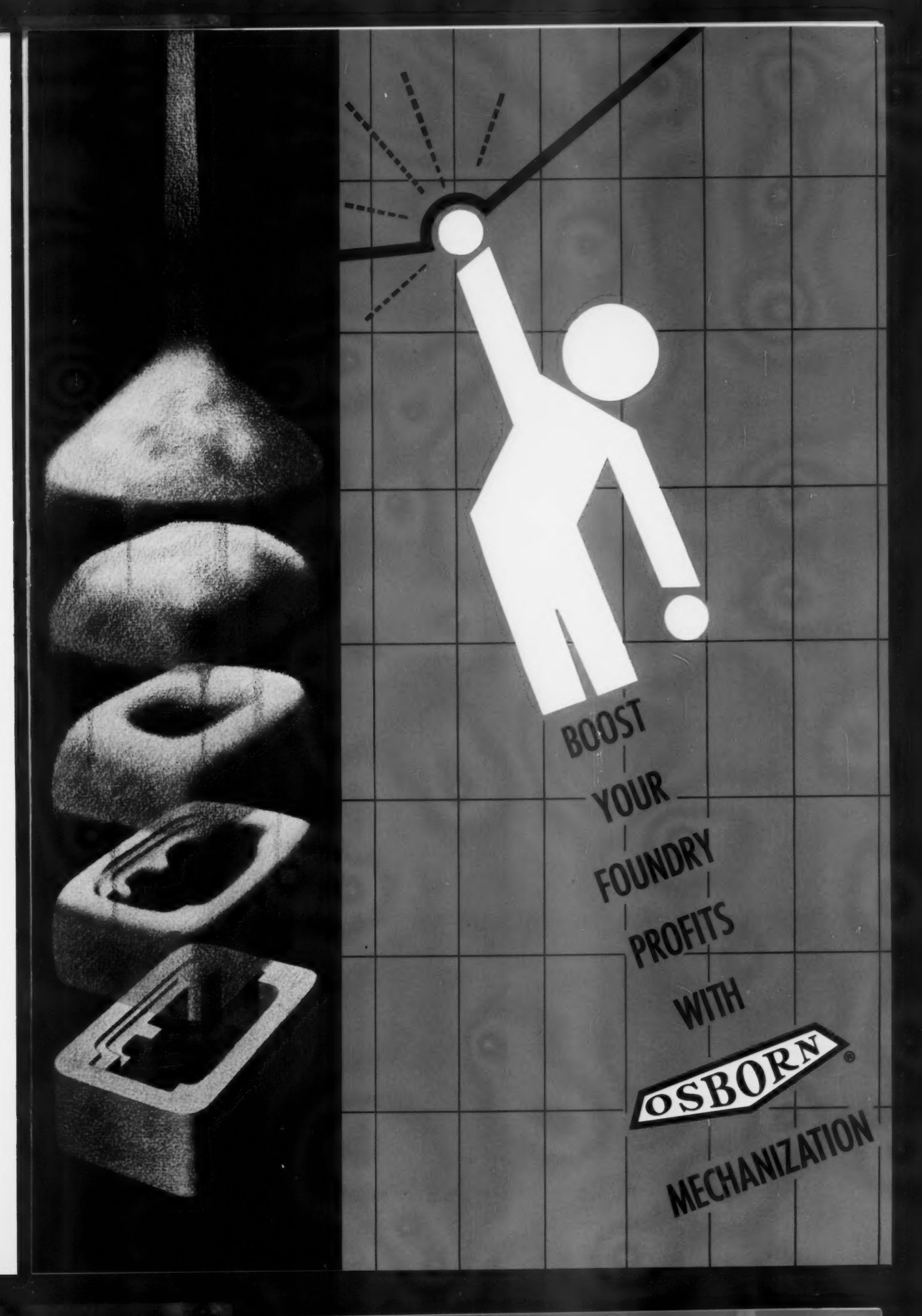
Circle 644 on Inquiry Card→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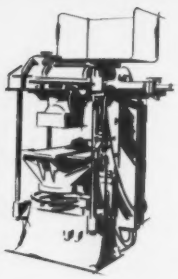

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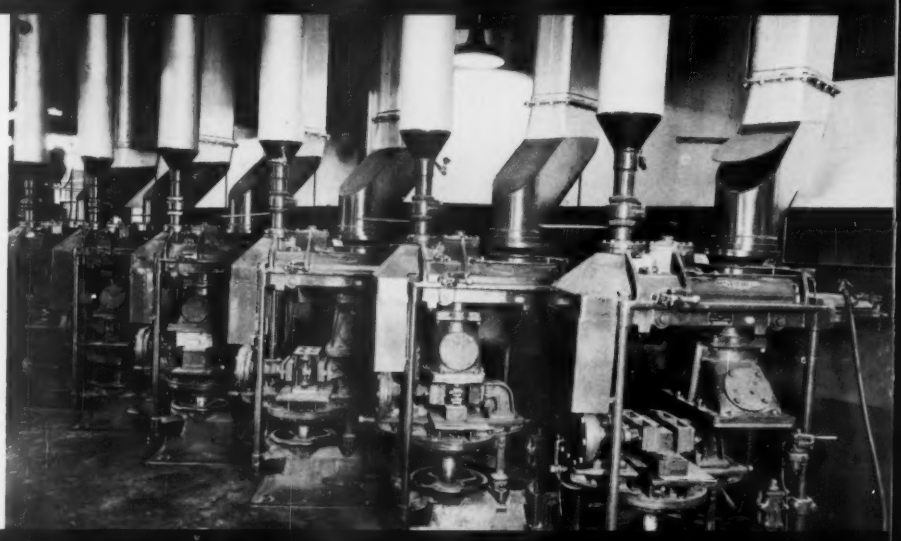
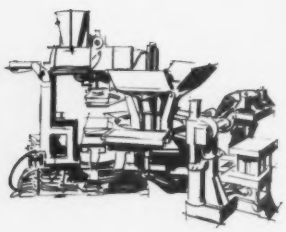
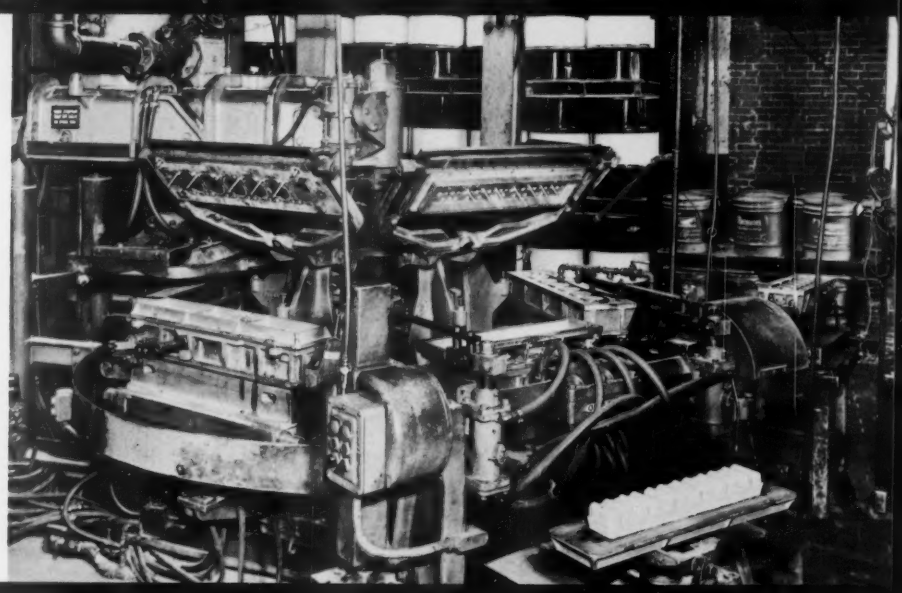




**ROTO-CORE® AUTOMATIC**

The versatile Osborn Roto-Core with cope handler produces five different cores or five identical cores at one time.



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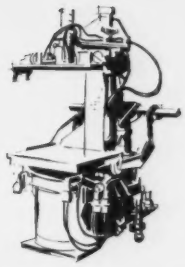

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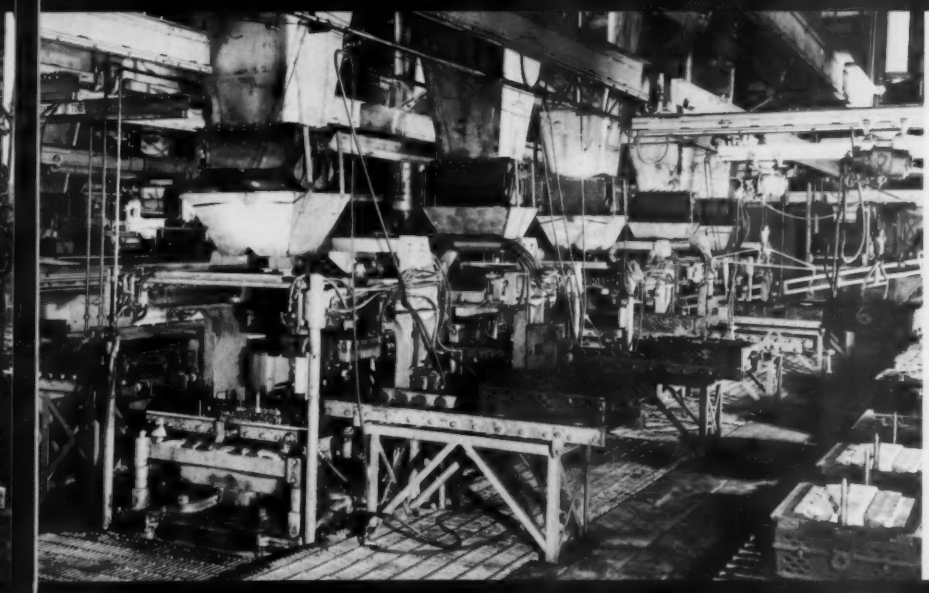

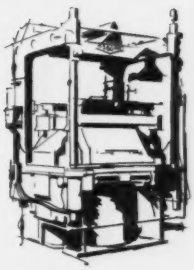

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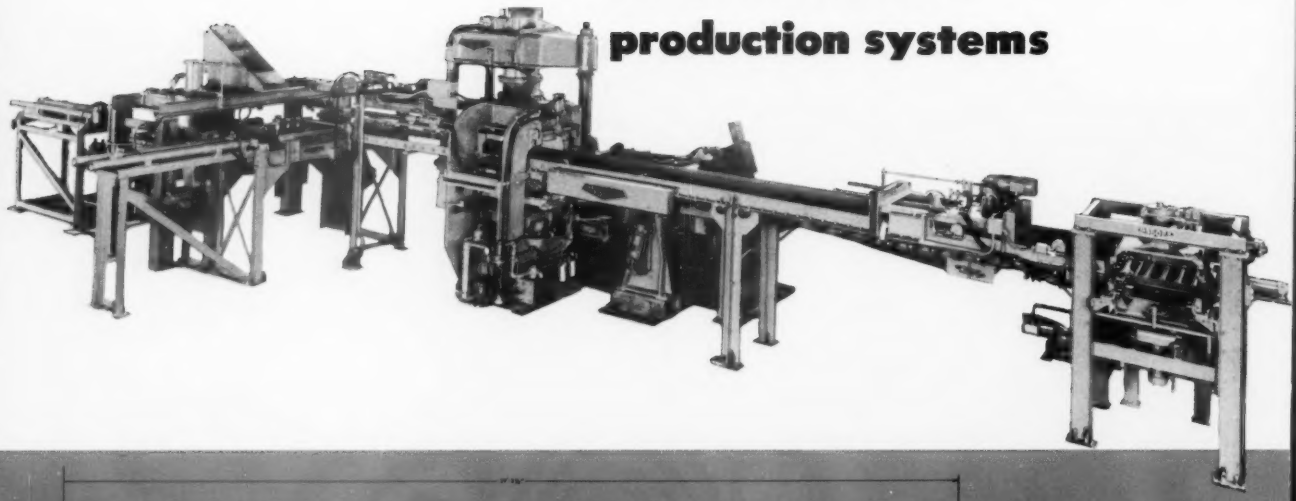
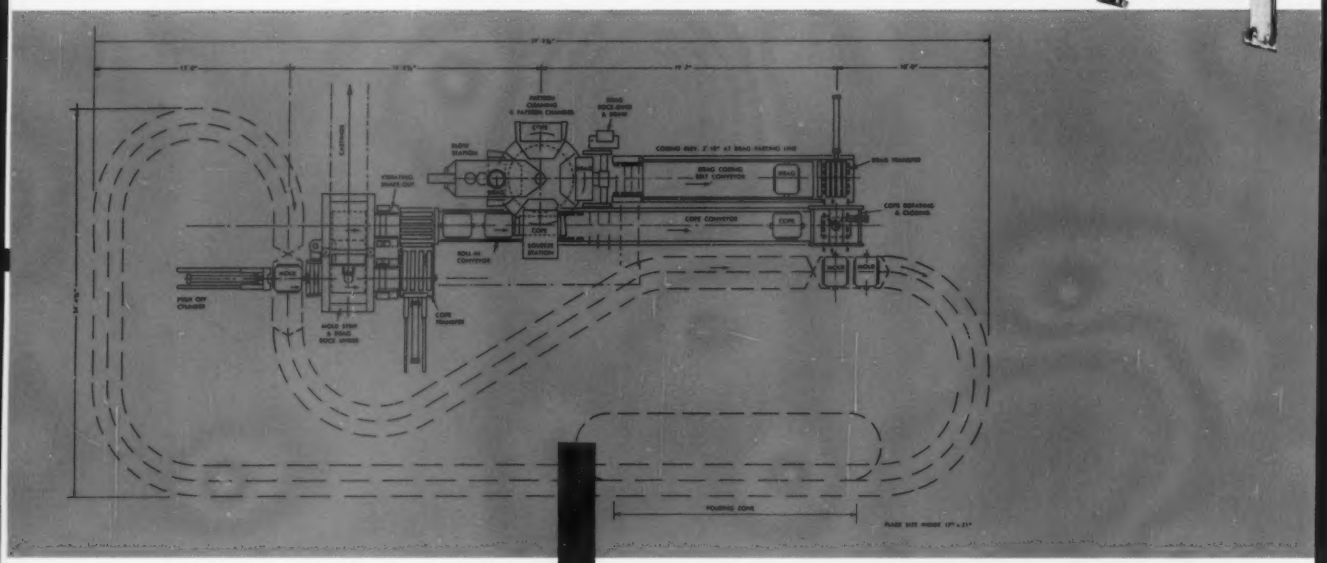
Automatically handles all operations of turning out quality molds at high rates of production.

***MECHANIZED MOLDING***

# To set new production standards... OSBORN'S fully-automatic production systems





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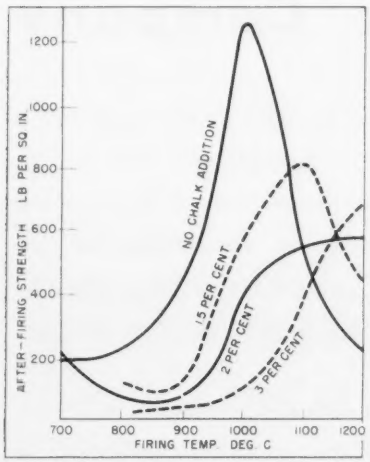
# Foundry Developments

By EDWIN BREMER
*Metallurgical Editor*

ADDITIONS of calcium carbonate in the form of ground chalk have been found to aid considerably in the breakdown of cores made by the $CO_2$ process and used in bronze and brass castings. Investigation was conducted by LeServe and Segrove and reported in the April 4 issue of *Foundry Trade Journal* (London).

Chalk ground to pass 100-mesh was added to the sand, after mixing with the sodium silicate binder, in proportions of 1.5, 2, and 3 per cent. With the 1.5 and 2 per cent additions




the initial gassed strength was appreciably higher than with binder alone. This strength was maintained for about 48 hr; then it decreased, although the cores were usable after a week's storage. With a 3 per cent addition the initial gassed strength was the same as with binder alone, but the cores became friable after two or three days.

As indicated in the accompanying diagram a peak strength of about 1250 psi was obtained at slightly over 1000°C without any chalk addition. With 1.5 per cent chalk a peak of about 810 psi was reached at about 1100°C, and with a 2 per cent addition the strength was only about 570 psi at 1200°C. With a 3 per cent chalk addition similar strength was obtained at around 1150°C, increasing to about 700 psi at 1200°C.

Authors indicate that a 2 per cent chalk addition is the maximum if the cores are to be kept for a considerable period, but if the cores are to be used immediately after gassing advantage should be taken of the better breakdown obtained with a 3 per cent chalk addition.

## Columbium Gets Nod

NEW entry into the high-temperature field may be columbium, according to Dr. Morris A. Steinberg, Horizons Inc., Cleveland. Preliminary results obtained by his and other firms indicate that necessary oxidation resistance and increased strength will be imparted to columbium by use of suitable alloys to satisfy gas turbine requirements for operation at 1800° F and higher. Columbium also may have applications in the nuclear energy field due to its low neutron cross section and its resistance to corrosion by liquid sodium, sodium-potassium alloys, etc. at elevated temperatures.

## Bouncing Electrons

COMPLEMENT to x-ray diffraction apparatus is the newly developed electron diffraction instrument, according to General Electric X-ray Department, Milwaukee. New unit bounces a stream of electrons off the surface of various materials to produce a characteristic pattern. Basic difference between the two is that electrons penetrate much less than x-rays so that the chemical composition and crystal structure of the substance's surface can be determined instead of the average of the entire sample as with x-ray diffraction. The new instrument can be used to study thin films formed on metal surfaces as a control for the process of making alloys.

## Sweet Binder

CORE BINDER described in German patent application DAS 1,003,-923 employs urea or phenolic resin with a saccharide such as acidified glucose. One example includes 120 kilograms of sand mixed with 12 kilograms of a composition made up as follows: 8.4 kilograms of water-soluble, cold-curing urea resin, and 3.6 kilograms of glucose acidified with nitric acid so that 100 grams requires 320 cc N/10 potassium hydroxide for neutralization. The sand mix hardens completely in a few hours without oven drying. By increasing the acidification of the glucose so that 100 grams require 530 cc N/10 potassium hydroxide for neutralization, and using the same formulation of sand, etc., the sand mix is said to harden in 10 to 20 minutes. Instead of urea resin, water soluble phenol resin may be used.

## Hot Cooling

REPORT is that steam cooling in cupola operation has been accomplished successfully in Germany. The cupola, melting 30 tons per hour, supplies hot metal for open-hearth furnace operation. The cooling system at 42 atmospheres (617 psi) pressure develops saturated steam at 250°C (480°F), which is superheated to 420°C (788°F) by waste gases from the cupola and fed into the plant's steam system. Water consumption is said to be less than 7 per cent of that required for conventional cooling in cupolas of comparable size. The unit has been in operation for eight months, and application of the system to other cupolas is expected.

## Gives Clean Metal

REPORTING in the March issue of *The Crucible*, published by the Non-Ferrous Founders' Society, Robert Langsenkamp, Langsenkamp-Wheeler Brass Works Inc., points out that a graphite, silicon carbide or carbon disk placed on top of molten metal in a crucible reduces temperature loss and zinc fumes, gives cleaner metal, speeds pouring and reduces splashing and rolling.

His foundry uses disks cut from electrode stubs obtained from steel foundries. Disks are about 2¾ in. smaller in diameter than the top of the crucible and about ¾-in. thick. The disk is preheated before being placed on the molten metal, which first is skimmed carefully. The disk catches any small dross particles and prevents their entrance into the pouring lip, resulting in clean metal over the lip. Life of the disk varies with metal temperature and care in handling; it averages from 75 to 100 pours.

# An Announcement of Great Importance to the Buyers of Foundry Equipment

Repeated from May Issue of FOUNDRY Magazine for Those Who May Have Missed It

affco

## American Foundry Flask Company

C. E. "Joe" Boettcher, formerly sales manager of the flask division of Black, Sivalls and Bryson, has been appointed to the same position with American Foundry Flask Company. Mr. Boettcher's engineering and sales experience in the flask field are well known. American Foundry Flask will maintain the same lines of distribution as Black, Sivalls and Bryson previously used.

The American Foundry Flask Company, a division of Cromb and Gagel, Inc., Kansas City, Missouri, announces the purchase of the sales and manufacturing rights to the "Perfection" or "BS&B" flask line made for over thirty years by Black, Sivalls and Bryson of Kansas City, Missouri.

This purchase included equipment, inventory, engineering data and all factors pertaining to the flask division of B.S. and B.

The same high quality, expert craftsmanship and engineering excellence previously found in this fine line of flasks will be continued, according to A. H. Cromb, president of the newly formed company. "Black, Sivalls and Bryson have set a wonderful and challenging record for us to meet and beat," said Mr. Cromb, "We are determined to both meet it and beat it."

affco AMERICAN FOUNDRY FLASK CO.

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# Industry Briefs

**GENERAL Electric Co.'s Foundry Department** will spend $1.6 million in 1957 for expansion and modernization of five foundry sites—Everett and Lynn, Mass.; Schenectady and Elmira, N. Y.; and Erie, Pa. About $941,000 will be invested in the Schenectady area, $275,000 in Elmira; $338,000 in Everett and Lynn; and $46,000 in Erie. These expenditures for modernization, improvement and increased capacity are in line with the Foundry Department's present marketing forecast, which indicates that the department will double its present daily tonnage by 1966.

**Cromb & Gagel Inc.,** Kansas City, Mo., has purchased the foundry flask division of Black, Sivalls & Bryson, which it has renamed the American Foundry Flask Co. and will operate as a division with offices at 2745 Southwest Blvd., Kansas City 8, Mo. American Foundry flasks will be sold nationally by the same distributors who formerly represented Black, Sivalls & Bryson, and C. W. Boettcher will continue as sales manager. Cromb & Gagel also operate Gresham & Co., a steel fabricating plant, and Machinery & Supplies Co., a contractor's supply company, in Kansas City, Mo., and the American Scale & Vise Co., Pleasant Hill, Mo.

**Electric Steel Foundry Co.,** Portland, Oreg., has purchased a 22-million volt betatron from Allis-Chalmers Mfg. Co. for installation in its Portland plant. Installation of the new unit will be completed in several months. The betatron will be housed in a 25 x 60-ft concrete pit 21 ft deep and will make possible radiographs of metal sections up to 20 in. thick.

**Shallway Corp.,** Connellsville, Pa., and Palo Alto, Calif., has established a Used Shell Equipment Division. The division will handle used shell mold machines, shell fusers, sand-resin blenders, shell coreblowers and related equipment.

**Yale & Towne Mfg. Co.,** Philadelphia, has begun production of heavy-duty gasoline fork lift trucks at its new plant in San Leandro, Calif. The $2½-million plant also will manufacture lift truck attachments and later will begin production on bulk material handling equipment. A factory distribution center will be established there. John T. McCarley, formerly assistant general manager of the material handling plant in Philadelphia, is manager of the San Leandro plant.

**Birdsboro Steel Foundry & Machine Co.,** Birdsboro, Pa., will invest more than $1 million for capital improvements in 1957. Purpose of the planned expenditure is further modernization and expansion of facilities. The program is expected to accelerate foundry production and to improve casting techniques.

**Shaw Process Development Corp.,** Port Washington, N. Y., has licensed Ross-Meehan Foundries Inc., Chattanooga, Tenn., to produce investment castings by the Shaw Process.

**Chicago Hardware Foundry Co.,** North Chicago, Ill., has initiated a program of expansion and consolidation of its nonferrous operations which will take about two years. The first step, now nearing completion, is construction of a new building to provide an additional 5000 sq ft of floor space. The company produces gray iron castings in addition to brass, bronze and aluminum.

**Herman Pneumatic Machine Co.,** Pittsburgh, has appointed Fred W. Fuller Co., Cleveland, to be its sales representative for the entire state of Ohio with the exception of Lucas county, which includes the Toledo area. In addition to its Cleveland headquarters, Fuller Co. will open a new office in Cincinnati.

**Vesuvius Crucible Co.,** Swissvale, Pa., has allocated upward of $125,000 for expansion of its manufacturing facilities during the current year.

**Fick Foundry Co.,** Tacoma, Wash., is constructing a 20,000-sq-ft addition to increase its facilities for the production of ferrous castings. The pres-

"Appleby! Appleby! I warned you about getting overheated!"

ent installation covers 72,800 sq ft, not including the company's nonferrous foundry and a two-story office building.

**F. J. Stokes Corp.,** Philadelphia, has opened a sales office at 1678 Cross Keys Drive Northeast, Atlanta, Ga., to serve Georgia, Florida, North and South Carolina, Alabama, Mississippi and Tennessee. Telephone number is Cedar 7-1684. William J. Fisher, formerly in the Philadelphia district office, will be in charge.

**Fuller Co.,** Catasauqua, Pa., has opened a new $1½ million plant at Compton, Calif. A subsidiary of General American Transportation Corp., Fuller manufactures pneumatic handling equipment, rotary compressors, vacuum pumps, preheaters and other products.

**U. S. Fire Protection Engineering Service Inc.** has established a new office in the Sheldon Building, 461 Market St., San Francisco. Paul D. Smith is manager. The company is a consulting engineering firm in the field of fire prevention and protection.

**Shell Equipment Co.,** Connellsville, Pa., has appointed the following sales representatives for its line of shell molding and shell core equipment: Cooper-Chapman Co., Toronto, Ont., for Canada and the states of New York, Vermont, New Hampshire and Maine; Pennsylvania Foundry Supply & Sand Co., Philadelphia, for eastern Pennsylvania and the Atlantic Coast states; and John J. Elias, Uniontown, Pa., for western Pennsylvania and eastern Ohio.

**S. G. Taylor Chain Co.,** Hammond, Ind., has been awarded the National Safety Council's Award of Honor for the best safety record in the chain manufacturing industry: 872,000 injury-free man-hours from Sept. 22, 1954, to Dec. 31, 1956. As of April 1, 1957, the total man-hours without an injury had increased to more than 1.1 million.

**Brumley-Donaldson Co.,** Los Angeles, will distribute fireclay brick and related specialty refractory products of North American Refractories Co., Cleveland. Brumley-Donaldson handles a line of foundry supplies and maintains warehouse facilities in Los Angeles and Oakland, Calif.

**Lewis-Shepard Products Inc.,** Watertown, Mass., has appointed Texas Materials Handling Co., 7728 Long Point Rd., Houston, Tex., its exclusive sales and service representative in southeastern Texas for the company's electric fork trucks and related material handling equipment.

**National Crucible Co.,** Philadelphia, has appointed Syracuse Fire Brick Supply Co., Syracuse, N. Y., exclusive representative in a wide portion of New York, northern Pennsylvania and western New England.

**Wheelco Instruments Division, Barber-Colman Co.,** Rockford, Ill., has established a sub-branch office at 20 Leland Ave., Columbus 14, O. In Cincinnati, the Wheelco branch office has moved to 8016 Plainfield Rd., Cincinnati 36. The Wheelco branch office address in Houston, Tex., now is 2712 Danville, Houston 6.

**Aluminum Alloys Casting Co.,** Huntington Park, Calif., has acquired all operational facilities of Quality Mold & Machine Co., Los Angeles. Together with expansion of its main plant, the acquisition increases Aluminum Alloys' aluminum melting capacity from 5000 to 10,000 lb daily.

**Metal Treating Institute,** New Rochelle, N. Y., reports that February billings of members were $3,337,900, or 6.8 per cent over the figure for the same period last year. Billings for the first two months of 1957 were 9.5 per cent higher than a year ago.

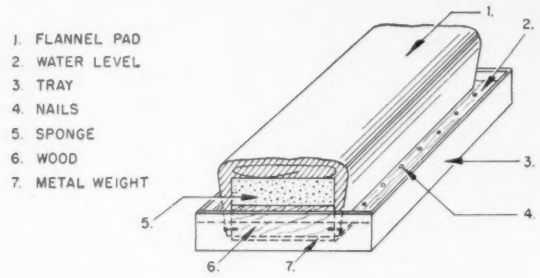
**Picker X-ray Corp.,** White Plains, N. Y. has taken over marketing and servicing of all Andrex x-ray equipment in the United States. The San Francisco offices of Holger Andreasen Inc., maker of this equipment, have been discontinued.

**Detroit Harvester Co.,** Detroit, has acquired the Danville, Ill., plant of F. L. Jacobs Co., Detroit, producer of actuating power equipment for retractible automobile hard tops, doors, seats and windows.

## HOW TO DO IT

# Trowel Moistener Aids Smoothing Of Sodium Silicate-Bonded Sands

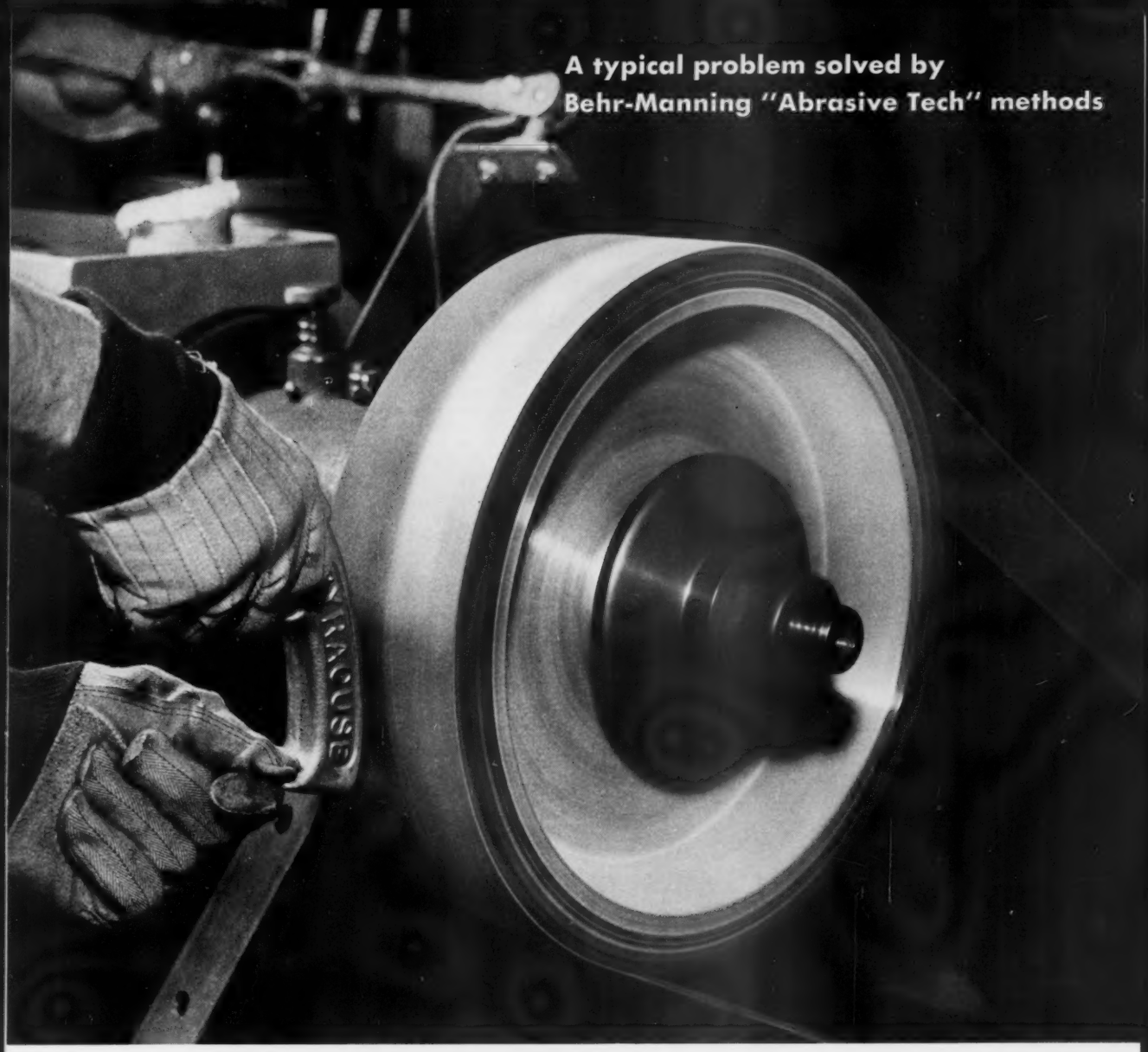
By HENRY M. GRIFFOUL
1655 Washington Ave.
San Jose, Calif.




TROWELLING uncured sodium silicate-bonded cores or molds sometimes is difficult because the sand sticks to the trowel. This results in rough-surfaced cores or molds that are not true to size. The problem can be solved by using a moistened trowel. Only a minimum amount of water should be used, however. Excess water may eliminate the bond of the sodium silicate.

The illustration shows a pad over which the trowel is passed to pick up approximately the correct amount of moisture. It consists of a wood block with a sponge on top and a flannel or wool cloth wrapped over the sponge and tacked to the sides of the block. A metal weight on the bottom of the block holds the assembly down in a tray of water.

**Do you have any trick of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea**




**To grind *and* polish castings with one belt:** Lubricate it with two greases of different weights. This permits stock removal on the light-greased half, polishing on the heavy-greased half, and you eliminate the extra step of changing to another belt. There are many such time-saving "Abrasive Tech" methods offered as a Behr-Manning service. Find out if there are any that can improve your production.

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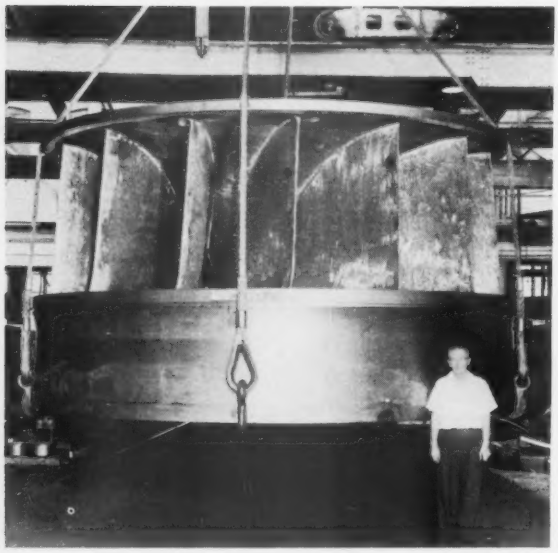
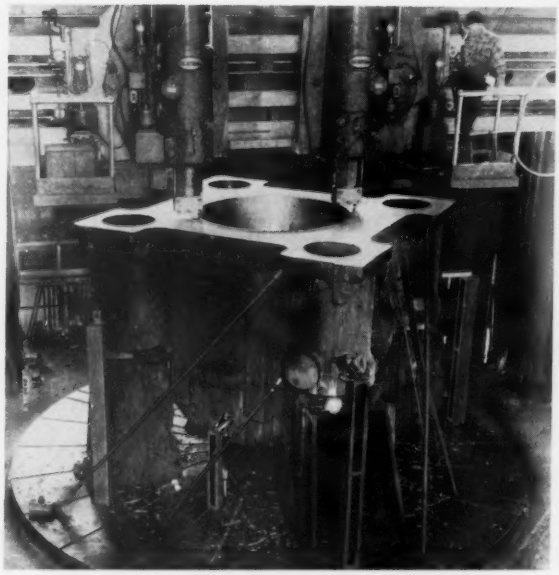
*Circle 646 on Inquiry Card—Page 51*

# *Speaking of* SIZE



Len Sterner, chief rigger, S. Morgan Smith Co., York, Pa., is dwarfed by a 73-ton, cast steel turbine runner. Intended for a new hydroelectric installation at the Chief Joseph Dam in the state of Washington, it is one of 12 being built, 6 of which were designed and manufactured by S. Morgan Smith. To handle the 17-ft-diam runner safely without marking the machined surfaces, a multiple wire rope assembly was employed. American Chain & Cable Co., manufacturer of the four slings, reports these are the first 2-in.-diam Cable-Laid slings put into service.



Allis-Chalmers says this is one of the three largest steel castings ever produced in Canada. It is part of a 16,000-ton, three-unit hydraulic press for forming large-diameter welded steel pipe. Each of the three cylinders weighs nearly 75 tons. Canadian Steel Foundries produced the castings. Machining was done at the Lachine Works of Canadian Allis-Chalmers Ltd., and Montreal Locomotive Works built the press for Welland Tubes Ltd. The press was designed by Verson Allsteel Press Co., Chicago.

Said to be the largest of its type ever cast, this 203-ton mill housing is destined for Kaiser Aluminum & Chemical Corp.'s plant at Ravenswood, W. Va. The housing, and a companion unit weighing 198 tons, will be part of a 168-in. four-high reversing mill for rolling aluminum. Both units were cast by the steel foundry of United Engineering & Foundry Co. at Vandergrift, Pa., and they were machined at Youngstown, O.

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- MALCOLM G. STEVENS Arlington, Massachusetts

MFS Market Development Council members and others at the conference included, front, left to right: L. G. Osborne; Franklin S. Catlin, Magnaflux Corp., a conference speaker; L. J. Wise, MFS president; Lloyd E. Young; and James W. Hallock. Back row, left to right, Lowell D. Ryan, MFS executive vice president; E. K. Simonsen; R. W. Crannell; F. A. Christoffer; Carl L. Liebau; and R. J. Lamarche

## *Malleable Founders Discuss*

# Marketing of Castings

By JACK C. MISKE
*Associate Editor*

EXECUTIVES and sales personnel of the malleable castings industry gathered April 10-11 for the eighth market development conference of the Malleable Founders' Society, at the Edgewater Beach Hotel, Chicago. They participated in a three-part program which covered the competitive position of malleable iron, a look at the industry by men outside it and means of improving selling and marketing practices of members.

The meeting was opened by Lloyd E. Young, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., who acted as chairman of the conference. Mr. Young introduced Leon J. Wise, Chicago Malleable Castings Co., Chicago, president of the society, who discussed the aims and activities of MFS and the marketing conferences.

Mr. Wise's remarks were followed by a discussion of "Competing Materials" by Prof. Richard W. Heine, University of Wisconsin. He was assisted by a panel which consisted of R. W. Crannell, Lehigh Foundries Inc., Easton, Pa.; Ernest Stockum, Dayton Malleable Iron Co., Dayton, O.; and Ross Gilmore, Superior Steel & Malleable Castings Co.

Prof. Heine discussed properties of various metals in terms of their mechanical, fabricating and process and chemical properties. He pointed out that malleable iron's mechanical properties are such as to enable it to be competitive. Since standard and pearlitic malleable are fabricated only as castings, they possess the advantages and disadvantages of the casting process as it competes with other forms of fabrication. Discussing chemical properties, he stated that such advantages as good castability, machinability, corrosion resistance, etc., should appeal to customers, but that better jobs of production and selling also will help. In summation, Prof. Heine stated that the malleable industry has not exploited its material to more than about 50 per cent of its potentials.

Mr. Crannell emphasized that the industry cannot be complacent. It must, he said, keep learning about its product and how it can be of more service. Mr. Stockum noted that Prof. Heine had referred very frequently to pearlitic malleable. He stressed that pearlitic malleable has great unexploited possibilities as an engineering material, particularly to replace forgings. In combination, the advantages of pearlitic malleable and the casting process comprise a formidable tool for the industry.

Mr. Gilmore described the intentions of the Air Force to use more cast materials in the future and also spoke of the need for the foundry industry to concentrate on learning more about casting design. He criticized the tendency of some foundrymen to simplification of design through elimination of cores and warned that such design ignores the inherent advantages of castings—flexibility of shape and ability to put metal only where it is needed.

First afternoon speaker was Frank S. Catlin, Magnaflux Corp., Chicago. Mr. Catlin said that with correct design, castings have many competitive advantages over parts produced by other types of fabrication. He

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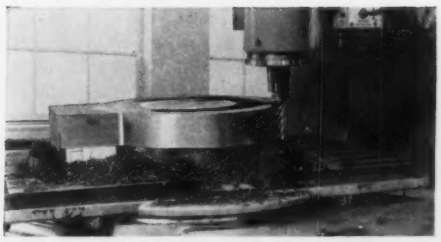

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went on to explain how the market for castings can be increased by the use in design of such testing tools as magnetic particle testing and stress analysis. For details of his talk, see "Testing Methods Valuable in Improving Casting Design," FOUNDRY, March, 1957, p. 168.

Byron Ertsgaard, assistant chief engineer, Toro Mfg. Corp., Minneapolis, spoke next, on "A Design Engineer's Viewpoint" and discussed the relationship between technical salesmen and design engineers. He regards technical salesmen as friends who bring new approaches to his problems, but he expects honesty from them. They should know and admit the limitations of their products and processes as well as the advantages, but do what they can to overcome the shortcomings while they exploit the advantages.

Mr. Ertsgaard likes to know when a salesman is coming. He does not want pressure selling. If the salesman knows his product and process, and they are good, they will sell themselves. He stressed that a good salesman holds in confidence what he learns about a customer. He also works with the customer and his tooling people for good design. Proper testing and quality control facilities and use of new techniques and materials are strong selling points.

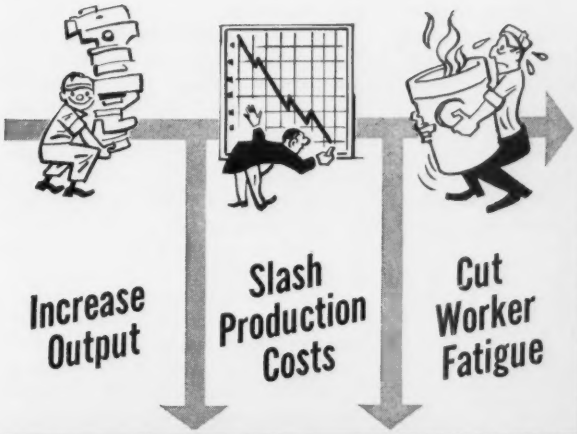
### Service Is Key to Sales

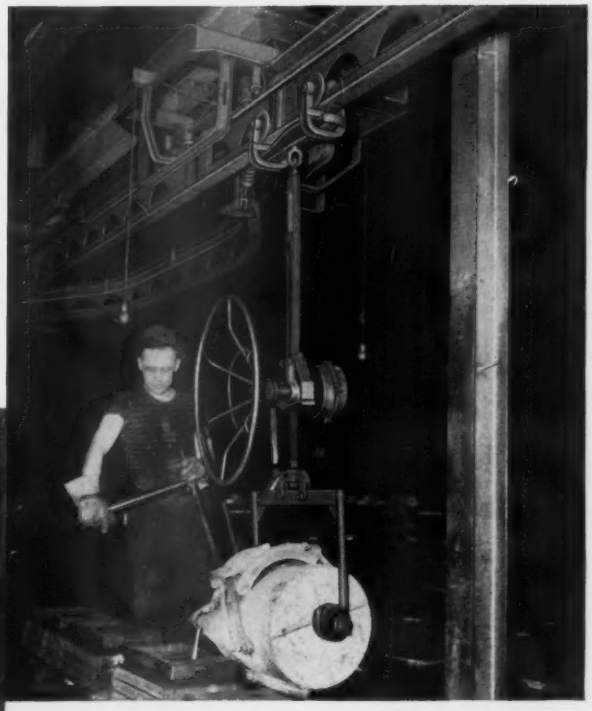
In conclusion, Mr. Ertsgaard emphasized that a good salesman goes out after business by looking for applications for his product. He cited the example of a castings salesman whose alertness led to the conversion by Toro of 19 weldments to castings. Service, he said, is the key to increased sales.

Final speaker for the first day was Edward B. Hill, Koehring Co., Milwaukee, whose topic was "The $30 Billion Road Building Program." Describing the nature and scope of the interstate road building program, Mr. Hill pointed out that this construction is in addition to all other federal, state and local programs. Expectations are that the entire roadbuilding program will amount to $102 billion by the time it has been finished, which will be in 13 to 15 years. Of interest to foundrymen is the fact that about $1 billion worth of road building equipment is required to do $1 billion worth of construction, and the average life of such equipment is six years. Thus the program should require more than $15 billion worth of equipment.

The second day of the conference opened with a brainstorming session on "Publicizing Malleable"—specifi-

# Convey Hot Metal *the Efficient* Tramrail Way



THE advantages that a Cleveland Tramrail System bring to a foundry are so outstanding that the results are often little less than phenomenal. Wherever the equipment is installed, efficiency usually spurts upward an exciting amount.

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**OVERHEAD MATERIALS HANDLING EQUIPMENT**

cally no little known uses of malleable castings. Purpose of this session was to provide material for an article or articles which would provide effective publicity for the malleable industry.

It was followed by a discussion of a brochure in preparation by the MFS. Built on the theme of "Value Analysis," the brochure will point out to potential users of malleable castings the values or advantages they offer to design engineers.

A progress report on the society's road machinery market survey, was presented by James W. Hallock, Albion Malleable Iron Co., Albion, Mich., chairman of the society's subcommittee on market research. Mr. Hallock reported on the results of a survey designed to determine how many manufacturers of road building equipment are using malleable castings and what can be done to increase that use.

A discussion of "The Major Aspects of Good Salesmanship," was led by Prof. J. R. Hawkinson, Northwestern University. Mr. Hawkinson was assisted by a panel of society members which included E. K. Simonsen, Belle City Malleable Iron Co., Racine, Wis.; J. P. Kelleher, National Malleable & Steel Castings Co., Chicago; and K. J. Breen, Eberhard Mfg. Co., Cleveland.

Prof. Hawkinson called selling a force which helps to maintain our standard of living. There are, he said, basic practices in influencing other people. They get results because people tend to be more alike than different. For example, he explained, people like to feel important, to have their points of view considered and to know whether something will help them.

Mr. Simonsen recommended that salesmen analyze their calls to determine what person or persons in each company influence purchasing. Such individuals vary with individual companies, particularly according to their size, and may be anyone from the president to a foreman. Mr. Kelleher emphasized the need for a salesman to know the company on which he is calling. He also recommended making appointments. Mr. Breen discussed the conduct of interviews with purchasing agents and noted that service always helps to make sales. He advised "creative selling" rather than price quoting.

**Need Is for Profitable Selling**

The last speaker was Lester B. Knight, Lester B. Knight & Associates, Chicago, on the subject "Let's Get Ready To Sell." The foundry industry, he said, is in a great state of flux—changes in technology and increased willingness to try new things are constant pressures on it. The industry goal should be to produce the best product possible at the lowest cost consistent with a reasonable return. Mr. Knight stressed the need for *profitable* selling. Tonnage should not be confused with profits.

The future, he went on, offers opportunity as well as change and uncertainty, but successful foundries will need more and better mechanization and increased individual productivity. Better handling during production and full use of productive capacity are required. Composite segmented patterns, with which many parts can be run simultaneously, in both long and short runs, will come into greater use.

The conference closed with the showing of "The Big Difference," a film produced by Superior Steel & Malleable Castings Co., which traces the replacement of a weldment by a casting as the result of brittle lacquer stress analysis and strain gage testing.


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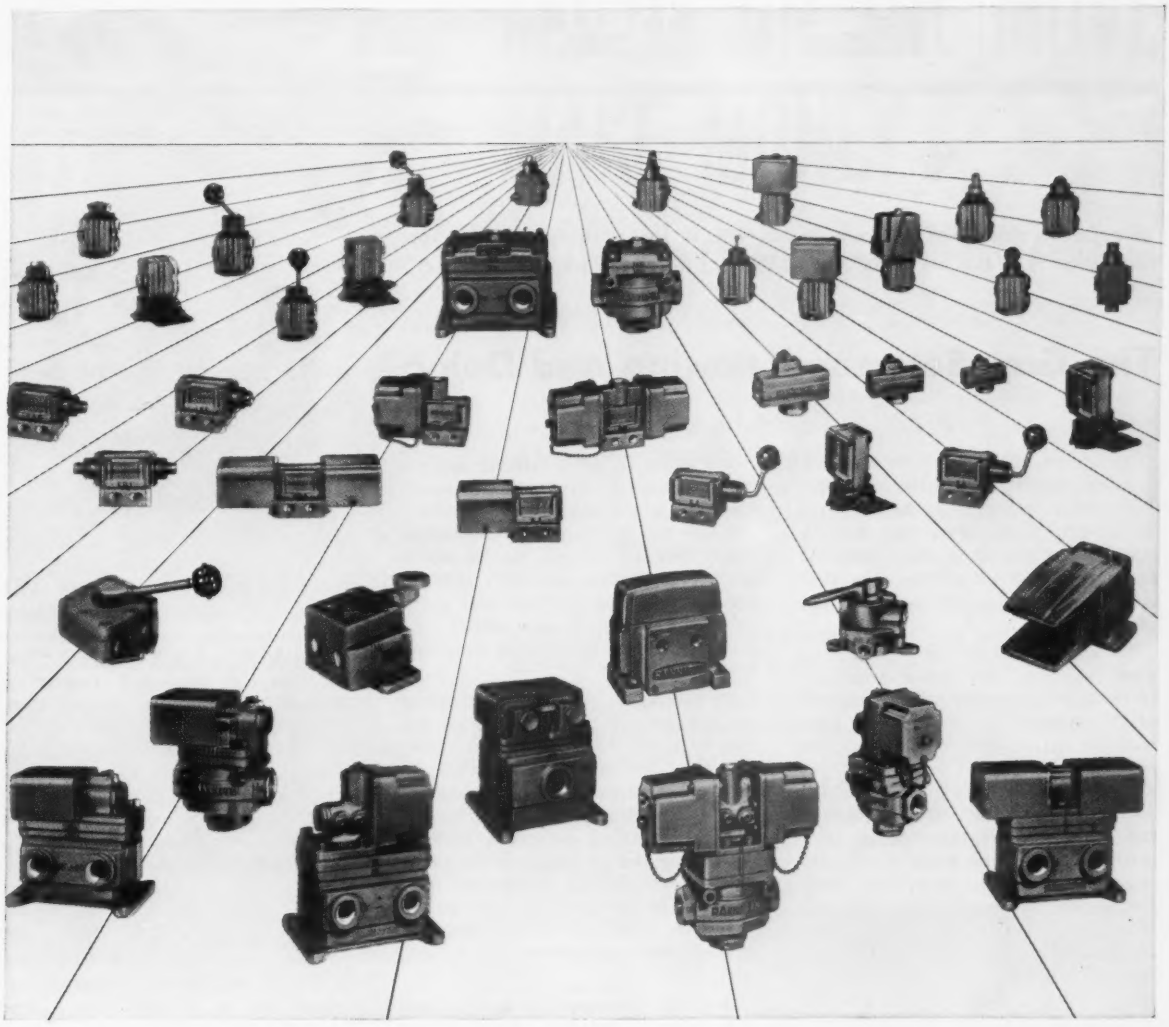

# These valves like tough jobs

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# Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

*"Blueprints don't tell the whole story. A lot of indispensable information is in the heads of the folks who do the work on a project"*

## The Gap Between Knowing and Doing

I catch myself saying over and over again, sometimes to others, but mostly to myself, "It looks to me as though there never has been a blueprint of a casting that contained even a fraction of all the dope that will be required to complete the piece."

I'll have to admit that this sounds kind of crazy, but when you stop to think of it, there's nothing on that print which tells the type of pattern to make, just what tools the patternmaker should use or how, the kind of sand which will be best, kind and size of flask, temperature of the metal, the machine tools, their setup, what change gears to use, the rake of the cutting tools, best feeds, the plating amperage and 101 other items. All this indispensable information is in the heads of the folks whose judgment and services are necessary for completion of the project.

In fact, if the blueprint were absolutely complete, it no longer would be a print, and it hardly could be a book. You might not even be able to lift it, for in all probability you'd have a shelf of books.

Boss Kettering (I hope that my frequent references to him will not tarnish his enviable reputation) told me years ago that if a company had a complete set of the prints and specifications for its competitor's products, by the time it got the hang of them, they'd be way out of date. The competitor would be building the new model by then.

**It Pays Off on TV**—I guess it's the information missing from our "how-to-do-it" recipes, formulas, and step-by-step instructions that demonstrates how wide the gap is between knowing how things are done and doing them ourselves. It might also suggest why the winners of quiz programs make so much more money answering questions than they do applying their knowledge.

For example, after writing to rubber concerns all over creation in an effort to get some rubber parts for the Lee Hobby Foundry sand tensile tester project, I ran into a stone wall. Finally, one of them told me very frankly that if I was ever going to get the whatchamacall'ems, I'd probably end up by making them myself.

They offered to help and furnished me samples of the raw material and step-by-step instructions, in overwhelming and confounding detail, including temperatures, relative humidities, viscosities, pH factors—just about everything except a sign of the Zodiac and the phase of the moon. Seventeen exacting operations were involved in the process (just to begin with, that is). They even sent one of their technicians out to help me.

**A Slow Process**—It's been a year now since I took my first wobbly steps. What makes me so darned mad after all of this trying is that

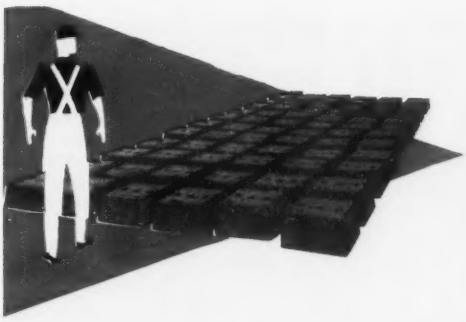
Blueprints are no substitute for information in the heads of men

I get some good ones along with too blankety-blank many bad ones, without knowing why the good ones are good and the bad ones bad. But just this last week-end, I sent up another distress signal to my rubber friends. Much to my surprise, they told me I wasn't doing badly at all—in fact, they made me feel that I was one of the inner rubber circle, practically one of the boys, and that my troubles were quite common. They also helped with my problem.

I must say that I found myself clear up to my hips in this article at this point without a clear idea as to what started me. When I mentioned this to Mother (that's Mrs. Lee, my wife, chairman of our two-member house cleaning and interior decorating committee and chairman of the board of the Lee Hobby Foundry), she unknowingly gave me a clue by reminding me of a visit from a group of GM Tech boys, all members of the GM Tech Foundry Club. They are sponsored by General Motors Corp. foundries on a co-op basis.

From their comments during their visit, it was quite apparent that their heads were chockful of facts, figures, formulas, principles, processes, procedures, statistics, tables and all the other most worthwhile data folks go to school to get. They didn't throw their academic weight around the old amateur one tiny bit. They were just a swell bunch of guys. But from their comments to me and to each other, I got the feeling that they'd like to stay with me for a spell, grab a shovel or a piece of pattern pine and try out some of their learning.

We all agreed that it would be a worthwhile project if it were possible



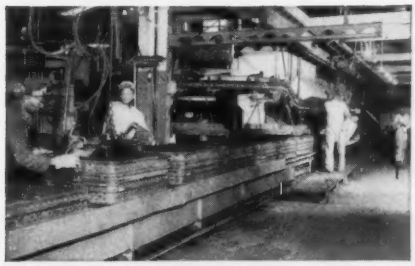
# MOLDS ON THE MOVE MAKE MONEY...

## Automation by Newaygo keeps molds on the move

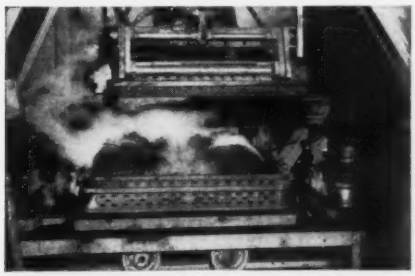
The trend today in progressive foundries is to automation. The goal is "more molds with fewer motions." The increasingly high cost of labor and materials clearly indicates to foundry operators that if profits are to be made and maintained they must look to the most efficient and economical methods of sand and mold handling and conditioning for their foundries.

Newaygo Engineering Co., one of the foremost specialists in designing and manufacturing automated foundry equipment, can give you the same expert experience and service they render to many others regarding foundry automation.

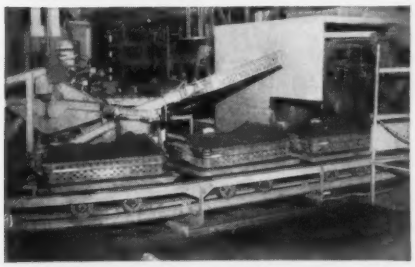
Newaygo specializes in designing and manufacturing automated foundry equipment for mold setting, closing, shakeout and flask and casting handling. Each job is engineered to fit the particular requirements of the foundry for which it is made. Building limitations, floor dimensions and existing machinery are considered and all equipment is put to the best use.



Cope and drag are joined at this point on an automatic Newaygo Car Conveyor Line. Molds are continuous poured as they travel by on the conveyor.

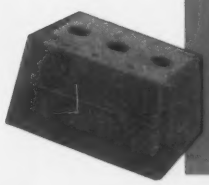


Cope shakeout station automatically removes and shakes out cope section of the flask. Complete automation cycle includes vibrating of cope flasks for excess sand removal and delivery of them into the automatic molding machine.



Showing automatic drag shakeout and flask handling as well as the automatic return of the drag flask into the automatic molding machine. Note the rugged construction of the Newaygo Car Conveyor as well as the hydraulic flask turnover.

Large mold being dumped by automation onto an Oscillating Conveyor below. This automatic shakeout feature allows dumping from one to five molds simultaneously. Bottom board and pallet are automatically returned to the molder.



*Let us show you how we can "keep the molds moving in your foundry". Write today for your copy of Newaygo Bulletin No. 56. Thirty-two pages of modern, efficient foundry equipment that will pay for itself in your foundry.*

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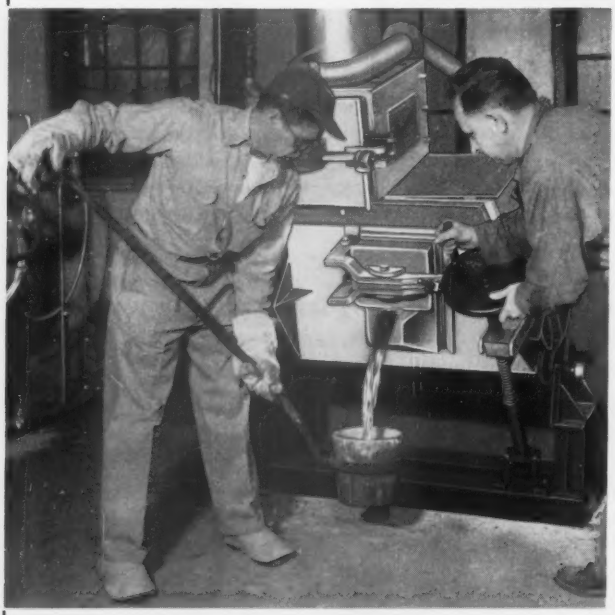

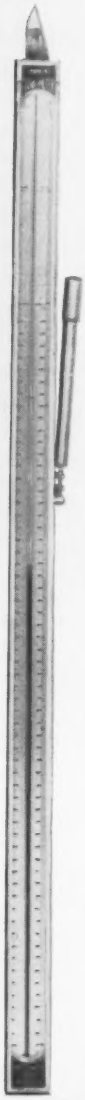

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for each of them, on his own, to play the full scale of the cast metals process from print to finished piece. On a departmental basis, they eventually will be able to fit in each piece of the jigsaw puzzle, but firsthand personal experience, both good and bad, facing up to their need for practiced skill, the variables to contend with and the value of patience with themselves and others, would speed the process, I'm sure.

**There's a Difference**—I don't think there can be any question that if young people and some not so young got the picture of the gap which really exists between knowing the names of the elements of an occupation, the ability to describe the processes involved and to apply what they've learned, they would be far more patient with the time it is bound to take to bridge this gap.

Maybe I'm off my base, but I'm beginning to feel that if some mysterious disintegration ray from outer space were to destroy all of our libraries of step-by-step, black-and-white recipes for doing or making anything, we'd soon recover from the terrible loss if we had a good understanding of the principles upon which the recipes were based and sufficient intestinal fortitude to accept the time it takes to put theory into practice.

There's another thing, too. We'd be speeded on our way if we kept in mind where a lot of the dope we've got to have, things that aren't on the prints or even in the books, is stored. It's in the heads of a lot of guys we had better learn how to get along with.

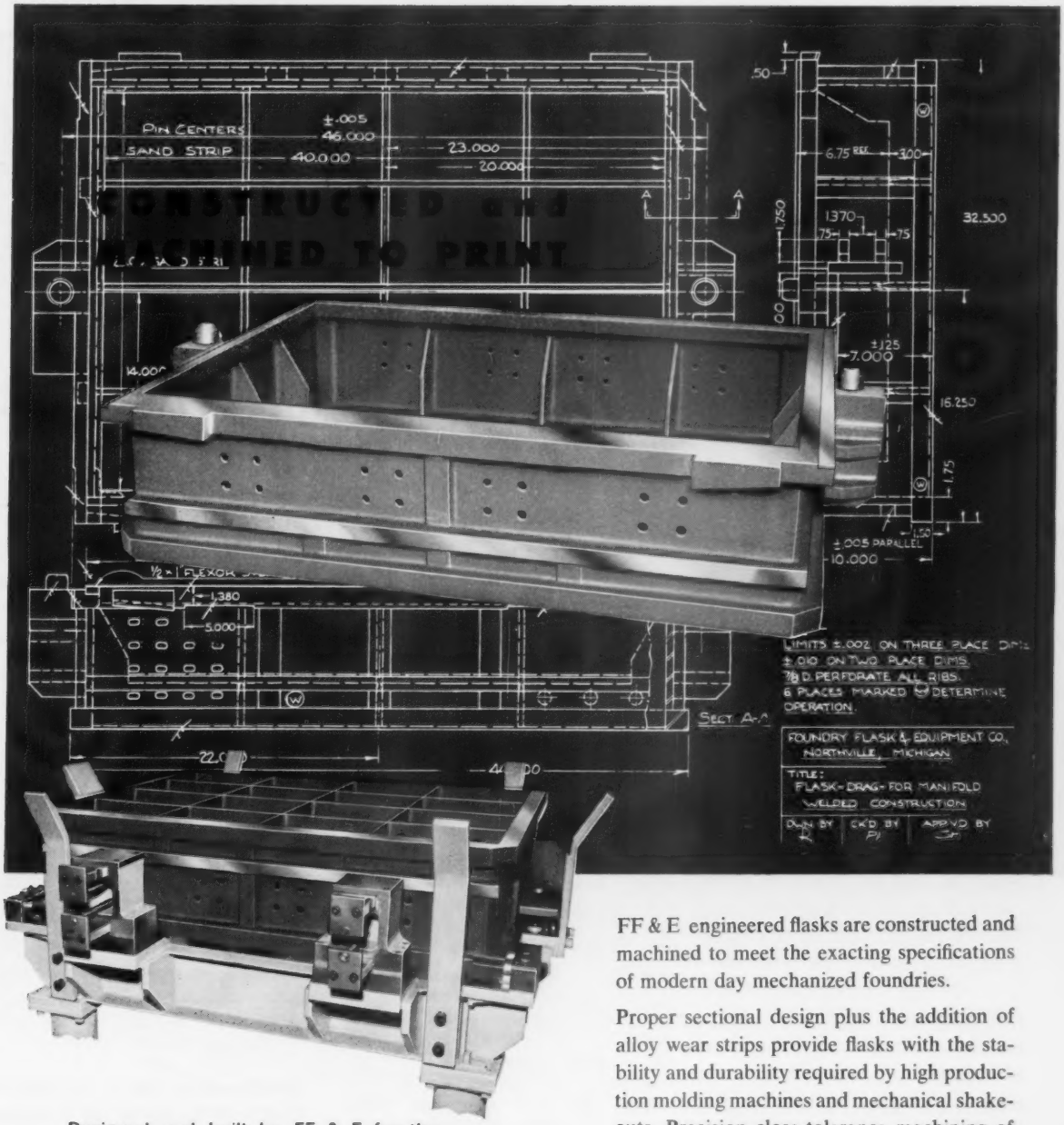
---

## Industry Survey Studies Future Foundry Management Problems

The Westover Corp., Milwaukee, recently surveyed a sizable segment of the foundry industry in an effort to evaluate problems which will confront foundry management in the future. Study indicated that there is a need for mechanization of foundry equipment, better costing and pricing methods, simplified and improved paper work systems, more efficient foundry layout to become more competitive and development of capable management personnel.

Better purchasing techniques, improved labor relations, development of new products and techniques, improved working conditions, quality control, apprentice training programs, shorter work week and the development of technical employees below the management level were other suggestions made by those replying to the questionnaire.

# FFE JOB-ENGINEERED FLASKS




Designed and built by FF & E for the maintenance department of a large automotive foundry, this checking gage qualifies the dimensional accuracy of the V-8 intake manifold flask pictured, prior to placement into production.

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# Properties of Cast Iron At Elevated Temperatures

## *Cast Iron Alloys Suitable For Applications at 800°F*

By J. R. Kattus*

SINCE 1954, a research project to investigate the "Properties of Cast Iron at Elevated Temperatures" has been in progress at Southern Research Institute, Birmingham, under the sponsorship of the ASME-ASTM Joint Committee on Effects of Temperature on Properties of Metals. The objective of this work is to determine the suitability of cast iron alloys for load-carrying applications in the temperature range 700°F to 1000°F.

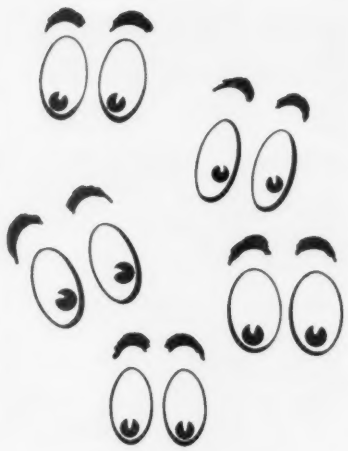
The following phases of work have been completed so far: 1. A literature survey of related work in this field. 2. Screening tests on twelve commercial cast iron alloys. 3. Creep rupture tests at 800°F and 1000°F on seven of the most promising alloys for times up to 5000 hours. 4. Thermal shock tests on the same seven alloys.

As a result of the literature survey and screening tests, the following seven plain and low-alloy cast irons were selected for creep rupture and thermal shock tests: 1. Molybdenum-alloyed pearlitic gray iron. 2. Nickel-molybdenum-alloyed pearlitic gray iron. 3. Chromium-alloyed gray iron with a matrix of 50 per cent pearlite and 50 per cent ferrite. This iron was annealed four hours at 1650°F. 4. Unalloyed, ferritic nodular iron. 5. Chromium-nickel - molybdenum - vanadium - alloyed pearlitic gray iron. 6. Unalloyed pearlitic gray iron. 7. Chromium - molybdenum - alloyed pearlitic gray iron.

The creep-rupture properties of the tested cast iron alloys are not promising for applications requiring the support of appreciable loads for long periods of time at 1000°F. The alloys with high short-time creep rupture properties at 1000°F underwent a sharp decrease in properties with exposure times of approximately 100 to 500 hours. The alloys that did not experience this sharp decrease had uniformly low creep rupture properties.

Test results indicate that cast iron alloys are suitable for load-carrying applications at 800°F. At this temperature, no sharp deterioration in

*Head, Metallurgy Section, Southern Research Institute, Birmingham.



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creep rupture properties occurred in exposure times approaching 5000 hours.

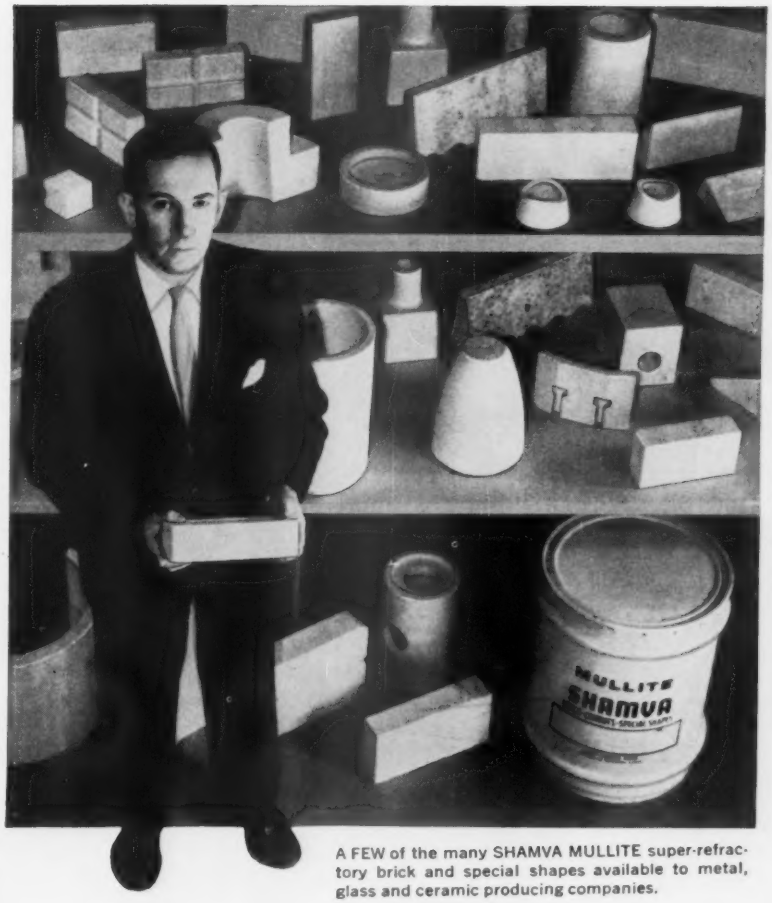
Alloying has a marked effect on the creep rupture properties of cast iron. Among the alloying elements tested, molybdenum is the most potent for improving these properties. The chromium-molybdenum iron had the best properties of all the alloys tested, but chromium additions alone were not beneficial to creep rupture properties. The chromium-molybdenum iron had creep rupture properties intermediate to those of a hot-rolled carbon-molybdenum steel and a hot-rolled low-carbon steel. All of the other irons were inferior in creep rupture properties to the low-carbon steel, although the chromium-nickel-molybdenum - vanadium iron approached it closely. The unalloyed ferritic nodular iron was slightly superior to the unalloyed pearlitic gray iron.

### Correlations Are Lacking

No consistent correlations have been developed between the creep rupture properties of cast iron and metallographic structure or heat treatment. Wide variations in creep rupture properties were obtained on pearlitic gray irons with similar matrix and graphite structures. In tests at 1000°F on as-cast irons, partial spheroidization of the carbide occurred after about 100 or more hours of exposure. This structural change correlated with the sharp deterioration in creep rupture properties. The structures of the annealed chromium-alloyed iron and ferritic nodular iron did not change during tests at 1000°F; these irons showed no sharp deterioration in their creep rupture properties, which were uniformly low. However, the creep rupture properties of annealed samples of the chromium-molybdenum gray iron, which was relatively strong, underwent a sharp deterioration after about 100 hours at 1000°F, although no structural changes could be detected after the tests.

In tests up to 5000 hours at 800°F, no structural changes were detected in any of the test alloys.

The suitability of cast iron for many applications depends upon its ability to withstand thermal shock. Past experience indicates that the most reliable thermal shock test data are obtained under conditions similar to those encountered in a particular type of service and are used only in conjunction with that type of application. Nevertheless, an effort was made in this work to determine the characteristics of cast iron under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severe thermal shock conditions. Since the creep rupture tests indicated that cast iron alloys are not promising for service at 1000°F, thermal shock testing was carried out only at 800°F.

After preliminary investigations of a number of possible thermal shock tests, a technique was adopted in which the test specimen was thermally cycled while it was subjected to any desired external bending load. The tubelike specimen formed the center section of a simple beam that was deadweight loaded equally at both ends and supported at two points on opposite sides of the specimen.

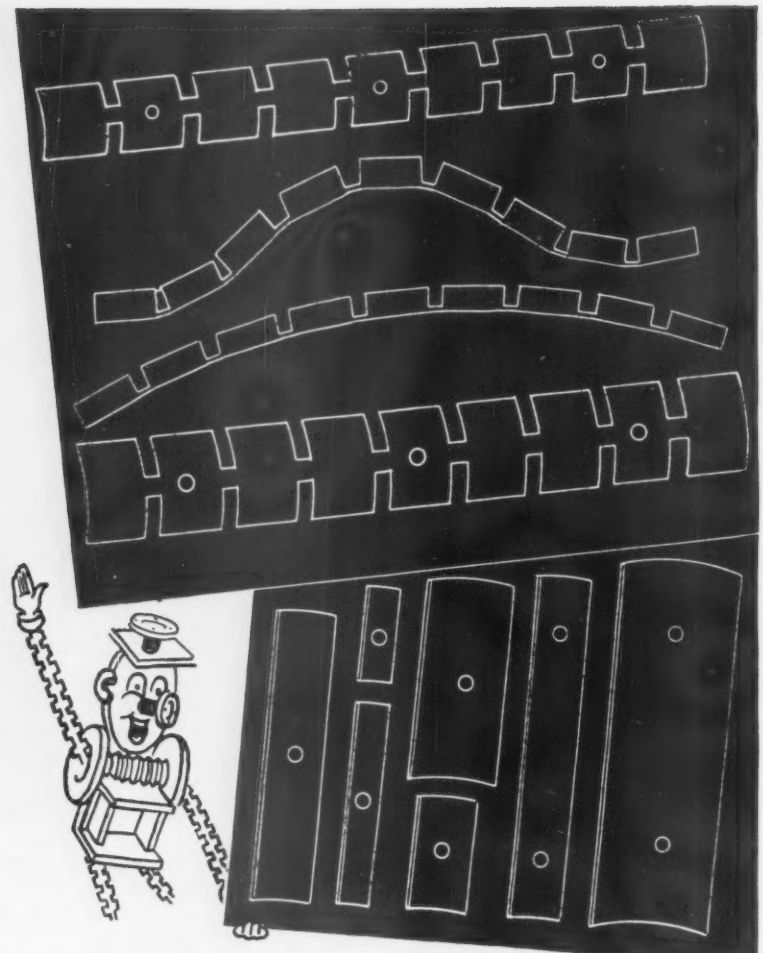
In carrying out a test, the specimen was loaded and thermally cycled between 800°F and 150°F, and the number of cycles to rupture was determined. The heating time in each thermal cycle was 85 seconds. Cooling was accomplished in 15 seconds by pouring water over the specimens. Both smooth and notched specimens were tested. The notched test was adopted as standard since it was more severe and applicable to all alloys. The smooth nodular iron specimens never ruptured in thermal shock.

| Alloy | 10-Year Rupture Strength at 800°F, psi | Thermal-Fatigue Endurance Limit in Tension at 800°F, psi |
|---|---|---|
| Chromium-molybdenum gray iron | 30,000 | 17,500 |
| Molybdenum gray iron | 25,000 | 15,000 |
| Chromium-nickel-molybdenum-vanadium gray iron | 25,000 | 16,000 |
| Unalloyed ferritic nodular iron | 17,000 | 27,500 |
| Unalloyed gray iron | 15,000 | 12,500 |
| Nickel-molybdenum gray iron | 25,000 | 18,000 |
| Chromium gray iron | ..... | 12,500 |

Each alloy was tested at a number of stress levels, and the data were plotted in the form of thermal-fatigue curves showing stress versus number of cycles to failure. A thermal-fatigue endurance limit invariably was approached within 100 cycles on the thermal-fatigue curves. Below the stress level corresponding to this number of cycles, thermal shock failures are not likely to occur under the conditions of the test regardless of the number of cycles.

The accompanying table compares the ten-year rupture strength and thermal fatigue endurance limit for various alloys at 800°F. Necessarily, the ten-year rupture strength is based upon an extrapolation of the test data and also upon an approximation afforded by the Larson-Miller Parameters.

Stresses shown in this table are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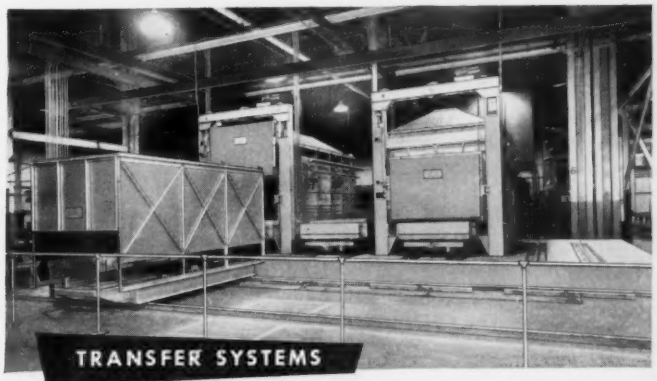
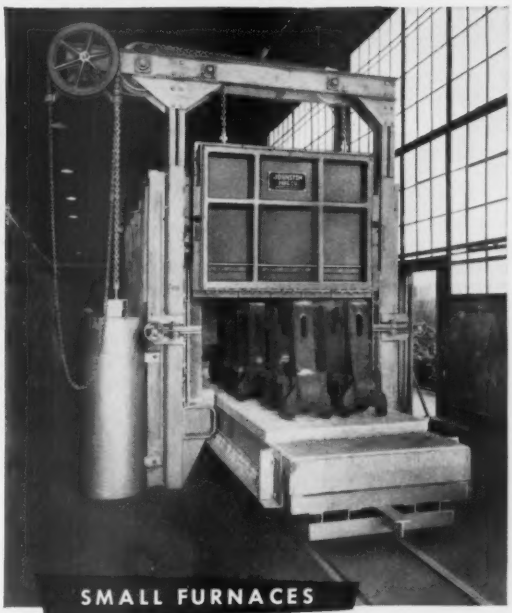



Designed for use where maximum production is demanded. Transfer systems are available with remote controls for complete operation from one point, complete with insulated transfer cars and hooded cooling stations.




The mainstay for years in heat treating departments. Available with complete program control, electric fluid drive car puller and door hoist mechanisms to provide for maximum in trouble free operation. All JOHNSTON car type furnaces have the proven mechanical seal between car and furnace.

***WRITE FOR BULLETIN F240 ON JOHNSTON CAR BOTTOM FURNACES***

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**MELTING FURNACES • HEAT TREATING FURNACES • HEATING TORCHES • LADLE HEATERS • GAS & OIL BURNERS • BLOWERS**

# Doing SHELL MOLDING? If so, you can now do it ECONOMICALLY!

- Amazing results easily obtained for shell molding.
- Quick blending of sand for conventional cores and molds.
- No other equipment will blend as fast or effectively.
- Only true mechanical duplication of mortar and pestle method of blending.

A Sancote Muller will give you increased production plus better castings. In addition, you will save up to 50% or more on resin costs.

Never before in foundry history has a new process received such rapid and wide acceptance as shell molding. Sancote Muller eliminates dust and health hazards in handling of phenolic resins and solvents

The Sancote Muller will coat sand automatically. Built-in ruggedly constructed anti-friction bearings throughout. It is built in three sizes with capacities from 100 to 1000 pounds.

While the Sancote Muller was specifically designed for the cold coating of sand with phenolic resin, it has worked wonders in the blending of silica sand with bentonite. It is not only a mixer but also a muller in the true sense of the word.

Send today for your copy of our new brochure showing full particulars.

Sancote MULLER

SHALLWAY MULLER CORP.

CAMBRIDGE, NEW YORK


recommended as the maximum applied tensile stresses for the various alloys in applications involving creep or thermal shock. It should be remembered that the thermal fatigue endurance limits are not absolute values, but are dependent on the conditions of the test. The values given apply to repeated severe applications of thermal shock equivalent to that produced in tests on notched specimens. Maximum stresses for service applications involving both creep and thermal shock should be based on the ten-year rupture strength or thermal fatigue endurance limit—whichever is lower.

The unalloyed ferritic nodular iron was far superior in thermal shock resistance to any of the gray irons tested. Small additions of molybdenum and nickel improved the thermal shock resistance of gray iron.

## Society Is Accepting Methods Improvement Contest Entries

Entries for the seventh annual methods improvement contest of the Industrial Management Society are now being accepted. The contest will be held in conjunction with the 21st anniversary industrial engineering and management clinic, Oct. 30-31—Nov. 1, 1957, at Hotel Sherman, Chicago.

Industrial plants, companies and student groups in colleges and universities are invited to submit entries.

First, second and third place trophies to winning schools and companies will be awarded for 16-mm films describing "before" and "after" phases of methods improvement projects. Individuals responsible for the improvements will receive certificates of merit.

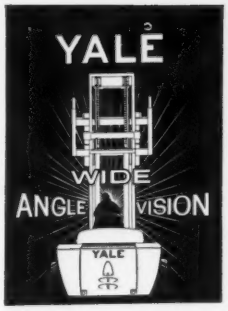
Rules of the contest may be obtained from the Industrial Management Society, 35 East Wacker Dr., Chicago 1.

## Book Review

*The Mechanisms of Phase Transformations in Metals,* cloth, 346 pages 5½ x 8½ in., published by The Institute of Metals, 17 Belgrave Square, London, S.W. 1, England. Price $7.50.

This volume contains a series of papers presented at a symposium organized by the Metal Physics Committee of the Institute of Metals and held in London on Nov. 9, 1955. Eighteen papers dealing with various aspects of nucleation and growth processes and martensitic transformations are presented with a full discussion of each paper.

# New Yale High-Capacity Gas Trucks with 300% MORE VISIBILITY




Only new Yale 15,000-20,000 lb. capacity Gas Trucks offer you "Wide-Angle Vision"—Yale's exclusive feature that gives the driver 300% more visibility for greater safety. Design advances such as nesting of upright channels; wide spacing of lifting channels and hoisting cylinders; high, center location of driver's seat assure not just unobstructed center visibility but also a greater arc of vision. New Yale Gas Trucks also feature a low center of gravity, a broader lifting base, wide channel-roller spacing and large high-flotation tires for maximum stability even under capacity-load conditions. Lifting speed of 60 feet per minute, fast controlled lowering, travel speed up to 20 MPH assure fast cycle operations.

## Features Important in Handling METAL CASTINGS:

• I-beam side members in frame for extra strength • Channels mounted on ball-bearing rollers to reduce friction and wear • Ball-mounted, self-aligning hoisting cylinders • Your choice of Fluid Coupling or standard transmission.

**To meet the need of expanding industries for better materials handling methods and equipment, look to Yale for advances in research, engineering, manufacturing, sales and service—as**

YALE BUILDS FOR THE NEW ERA

# YALE*

## INDUSTRIAL LIFT TRUCKS AND HOISTS

*REG. U. S. PAT. OFF.

**Gasoline, Electric & LP-Gas Industrial Lift Trucks • Worksavers Warehousers • Hand Trucks • Hand and Electric Hoists**

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Roosevelt Boulevard, Philadelphia 15, Pa.
Please send me the new Yale High-Capacity Gas Truck Bulletin No. 5230.

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## *Future Trends Considered at*

# East Coast Regional Conference

Left to right, Lewis H. Gross, American Standard Corp., Baltimore, conference co-chairman; Walter Giele, Walter Giele Co., Lebanon, Pa., general conference chairman; and R. A. Colton, Federated Metals Division, American Smelting & Refining Co., Newark, N. J., conference co-chairman

From left to right, William W. Maloney, general manager, AFS; Frank G. Steinebach, editor, FOUNDRY; Harry W. Dietert, president, AFS; and Jack H. Schaum, editor, *Modern Castings*

Left to right, Fred Barbour, Republic Steel Corp., Cleveland; W. J. Kelly, Lynchburg Foundry Co., Lynchburg, Va.; Hermann P. Good, Textile Machine Works, Reading, Pa.; G. C. Cole, Wysong & Miles Foundry Inc., Greensboro, N. C.; W. E. and T. G. Boswell, Glamorgan Pipe & Foundry Co., Lynchburg

By FRANK G. STEINEBACH
*Editor*

THE foundry industry is becoming a complicated business. If there was any doubt about this trend, it was removed during the first day of the East Coast Regional Foundry conference held at the Benjamin Franklin Hotel, Philadelphia, April 12-13. The meeting was sponsored by the Philadelphia, Chesapeake and Metropolitan Chapters of AFS.

The first day's session was concerned chiefly with the application of chemistry to foundry production, and the impact of the atomic age to the industry as a supplier of materials and as a user of radioactive materials in production processes.

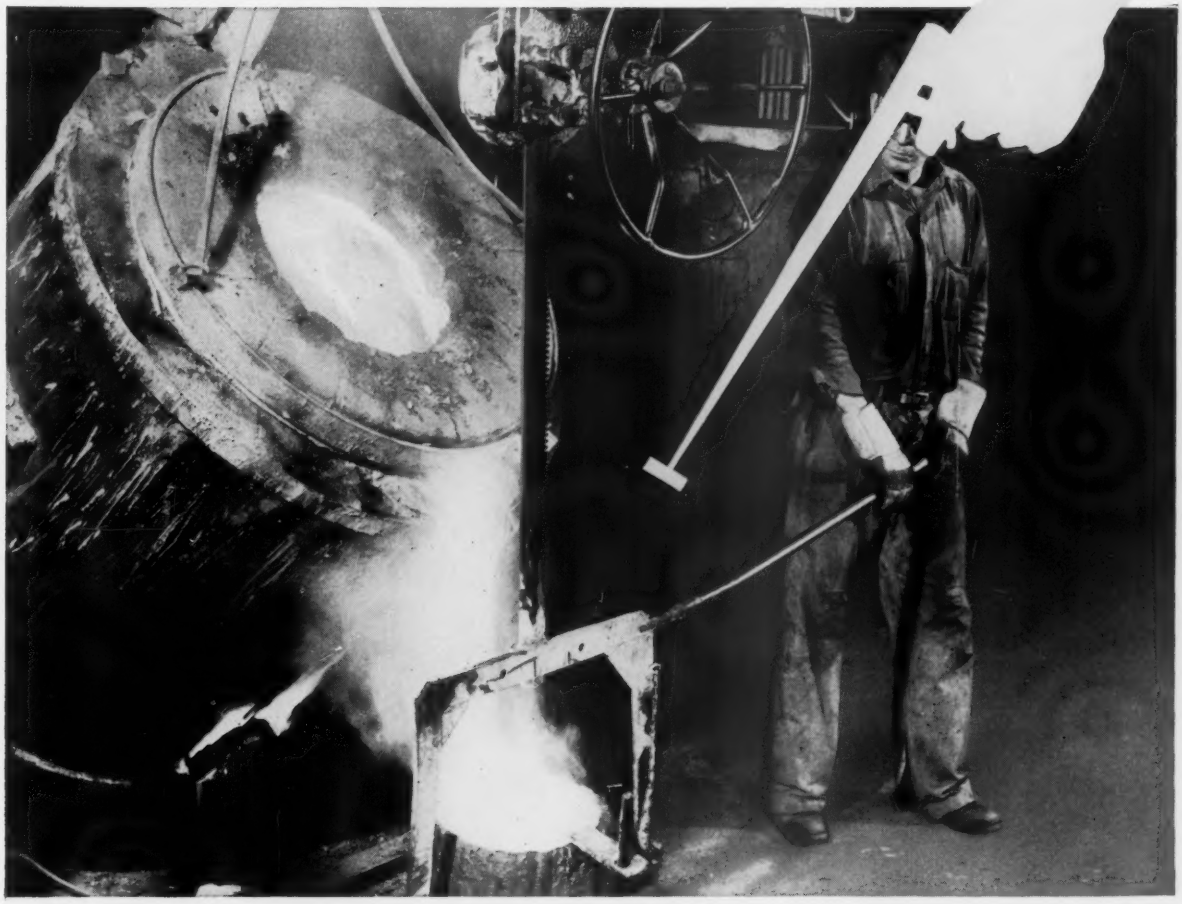
In discussing resin use in foundry practice, O. J. Myers, vice president, Reichhold Chemicals Inc., White Plains, N. Y., stated that every day sees a greater consumption. Although all of this resin is not used for shell molding, both shell molding and shell coremaking are increasing in acceptance.

The trend today is away from use of the powdered type as the sole binder in shell molding and is toward the use of coated sands. Several distinct types of mixtures are being used with varying degrees of success. Mr. Myers discussed some of these in detail. He also pointed out that plastics are finding their way into the foundry industry in many other areas than coating sand grains. They are found in the pattern shops in epoxy resins, shellacs and shellac substitutes for the coating of wooden patterns. Plastics also are used as a binding material in most of the core washes and mold washes and many core pastes.

Discussing "Ideas for Patternmakers," Melvin K. Young, assistant products manager, U. S. Gypsum Co., Chicago, told how new epoxy resins are being used by foundries. He pointed out that in addition to the advantage of low cost, plastic plates can be made in shorter time, they require little equipment to fabricate and are light in weight. The resins also have low shrinkage, good resistance to heat, high compressive strength and good sand release properties. They have good wearing qualities and can be repaired easily. Mr. Young presented the techniques in using epoxy resins.

Speaking on "Metallurgical Re-

# A Touch in the foundry does so much



## "SMOKELESS, SMOOTH, TOUGH"...

That's what foundrymen call 'dag'® Colloidal Graphite when they're talking about better castings, less finishing time, fewer rejects, and the end of smoke problems. They appreciate the simplicity of mixing 'dag' dispersions with water, and its ease of application. They like the tough protective film of pure graphite that's left on every surface and in every corner . . . a film that resists high temperatures, gives clean parting and smooth-surfaced castings. No carbonaceous deposits, no smoke and less porosity are other advantages of 'dag' dispersions.

An Acheson Service Engineer will be glad to discuss with you the advantages of 'dag' colloidal dispersions in permanent mold casting, centrifugal casting, die casting and other foundry applications. In the meantime, write for Bulletin No. 423 on metal casting and other applications involving high-temperature lubrication. Address your request to Dept. F-6.

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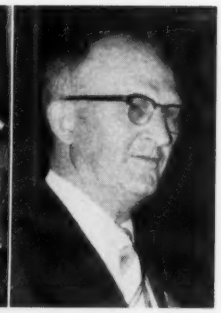
## CONFERENCE SPEAKERS

WALTER E. GRUVER JR.

JOHN CHAHBANDOUR

OTTO W. WINTER

TOM BARLOW



DR. W. A. PENNINGTON

J. M. SIMMONS

O. JAY MYERS

HARRY KESSLER

quirements for Atomic Applications," J. M. Simmons, chief, Metallurgy Section, Engineering Development Branch, Division of Reactor Development, Atomic Energy Commission, Washington, said that through the knowledge developed by metallurgical and power plant engineers in conventional power plants, the reactor industry has progressed more rapidly in 14 years than the steam-power industry did in the first 100 years. Nevertheless, use of conventional materials in the reactor heart—the firebox where the fuel is liberating the intense heat—has been kept to a minimum. New metals and materials have been developed to meet reactor needs, such as beryllium and zirconium.

Mr. Simmons stated that failures in piping, valves, heat exchangers, plates and flanges have caused much lost time. A research program on design, construction and testing of standard equipment is being considered. He indicated that co-operation of foundrymen may be asked in hand tailoring raw materials for melting in following each casting through the molding and pouring processes, and then studying the finished casting as a part of a machine.

The speaker indicated a real need for alloys of higher yield strength than Type 304 with corrosion resistance to high temperature water, to weak sulphuric solutions, or to chlorides, and steel which will endure under fast heating and cooling cycles while highly stressed and at the same time being bombarded by neutrons and fragments of fractured atoms. Efforts also must be made to use low alloys in reactors in order to reduce plant costs and make them competitive with conventional equipment.

The second paper in the field of nuclear energy was presented by William A. Pennington, professor of metallurgy, University of Maryland, College Park, Md., on "Application of Radioactive Materials in the Foundry." Dr. Pennington pointed out that the greatest use of radioisotopes in industry is in radiography. Technicians have adapted a new tool, cobalt 60, to an old, accepted, and respected technique.

Tracer techniques have been employed in many investigations involving chemical reactions such as desulphurization, phosphorus, distribution between metal and slag, and corrosion. Many diffusion studies have been made using tracers. Radioactive gages, using cobalt 60, are being used to measure the height of liquid metal present in foundry cupolas.

Dr. Pennington stated that a radioactive element can be introduced into either ferrous or nonferrous castings to determine the time and temperature for annealing so as to break up the cored or dendritic structure and obtain virtual homogeneity. Cerium 141 and cerium 144 now can be procured and perhaps can be used to learn more of the mechanism of nodular graphite production directly from the melt.

New developments in foundry equipment was the theme of the Saturday morning session. The first paper, "Understanding the Carbon Dioxide Process," by Walter E. Gruver Jr., Meehanite Metal Corp., New Rochelle, N. Y., is presented in full elsewhere in this issue.

Tom Barlow, sales manager, Eastern Clay Products Department, International Minerals & Chemical Corp., Chicago, discussed some of the problems and practices of high-pressure molding. He said that the purpose of Diaform molding equipment is to get a more uniform and dense mold, thereby reducing the tolerance of the casting. The method requires a strong flask or an ordinary flask with an upset which is a part of the machine.

Mr. Barlow discussed these sand factors which must be considered in high-pressure molding: Relatively high strength to obtain maximum hardness; high toughness combined with high flowability; low moisture even in fine sands; ability to hard ram without expansion defects; and ability to modify properties quickly and precisely.

Many factors which must be considered in producing hard-rammed shell molds with accurate uniformity and consistency were discussed by Otto W. Winter, Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago. He stated the sand should drop vertically onto the pattern; should be a rainfall and not a glob drop; have high velocity impact; provide an even layer of sand on the

# For High Quality DUCTILE IRON CASTINGS...

## Specify NEVILLE ILP PIG IRON

IF YOU produce or plan to produce ductile iron castings, you'll be interested in these important facts about Neville ILP (Intermediate Low Phosphorus) Pig Iron.

1. Neville ILP Pig Iron is manufactured by a merchant producer from *selected* raw materials.
2. It is a uniform, high quality iron with a controlled *minimum* of subversives.
3. It is produced and stockpiled within very close silicon ranges, and with sulphur, phosphorus and manganese content well below maximum limits specified by industry standards.
4. It is regularly used for the production of ductile iron castings by many of the nation's leading captive and jobbing foundries. (Names upon request.)

You'll discover that Neville ILP Pig Iron can meet the requirement of *any* ductile iron casting you make. And there's a good chance you'll be able to realize appreciable cost savings through its use!

Write or call today for more information about Neville ILP Pig Iron. Our technical service department will be glad to assist you in your application problems.

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pattern; and should provide a uniform mass drop.

The speaker indicated that shell molding equipment should have a dust-tight seal at the point of contact with the pattern; should have water cooling at that point; provide automatic conveying of resin-sand mixture to the machine, and have the shell removed from the machine face up to minimize mold drop off due to jarring of the pattern.

He emphasized the importance of keeping the pattern consistently at the desired temperature with an independent heat source with thermostatic controls.

John Chahbandour, Carrier Conveyor Corp., Louisville, indicated there are many applications for conveyors in the foundry industry. The basic use is the collection of sand and castings from mold shakeout stations. Units also are used to separate castings and sand, to handle castings during cooling, to separate back-up shot and castings in shell molding operations, and to convey and roll over large castings. Vibratory conveyors also may be used as a castings quench conveyor and on picking tables.

Advantages include the prevention of spilling, resistance to impact and abrasion, ability to handle high-temperature materials, possibility of using cover for dust-proof construction, and the fact that screening, cooling and casting rollover are possible while conveying. Mr. Chahbandour discussed the two major types of vibratory conveyors and the three basic types of drives.

The chapter officers and the members of the conference committee were pleased with both attendance and interest in the affair. Approximately 300 attended the various sessions.

Harry W. Dietert, president, Harry W. Dietert Co., Detroit, and vice president of the AFS, told the meeting that the national society is working on plans to serve the foundry industry better. He spoke of the new institute recently established by AFS and outlined the courses to be held this fall.

W. A. Morley, general superintendent, Link-Belt Co., Philadelphia, and a director of AFS, welcomed the visitors to the conference. He stressed the fact that the future progress of the foundry industry will depend on how well the available scientific and engineering knowledge is applied to the job of producing castings.

Harry Kessler, president, Sorbo Mat Process Engineers, St. Louis, and one of the best boxing referees in the business, discussed some of the fights he has handled at Madison Square Garden and showed some interesting movies at the luncheon meeting.

Mr. Kenneth MacFarland, General Motors Corp., presented a most interesting and inspirational talk at the banquet.

All photographs are by Leo Houser, Dodge Steel Co., Philadelphia.

## Book Review

*Industrial Engineering Handbook*, Harold B. Maynard, editor-in-chief, cloth, 1504 pages, 6 x 9 in., published by McGraw-Hill Book Co., 327 West 41st St., New York 36, N. Y. Price $17.50.

Comprehensive handbook provides engineers and management men with factual and how-to-do-it information covering many practices in the engineering field. Data, principles, methods and procedures on important aspects of industrial engineering are covered, including automation, linear programming, quality control and tool and gage design. Human and industrial relations are stressed throughout. Chapters were written by 81 authors and provide descriptions of the best in practical industrial engineering practices.

- **Perfect center balance** of wheel and motor ensures grinding ease and efficiency.
- **"Worker safety"** is carefully provided.
- **Greasing** required only once every six months . . . guaranteed for two years against repairs, exclusive of electrical equipment.

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OLIVER BUILDING PITTSBURGH 22, PA.

This superior bonding clay is really something new in the industry. It has a terrific range of applications; indeed, the more you use it, the more uses suggest themselves. Quality, of course, remains consistent because of strict laboratory control. We'll be glad to send you the name of your nearest distributor—who also handles our quality FIRE CLAY and BONDING CLAY. Ask for free samples of our products; after all, these are our best salesmen.

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# Around the Country

NEWS REPORTS FROM

**Chicago . . . Pittsburgh . . . Philadelphia . . . Penn State**

***Pittsburgh***— Demand for mill equipment continues strong, although sales are dropping slowly from record heights of the past year. For example, a Blaw-Knox Co. spokesman reports, "In foundry and mill machinery activities, we continue to receive favorable bookings for rolling mill equipment and accessories. Demand has tapered off for some of the maintenance and replacement steel plant equipment which the company produces."

Hyde Park Foundry & Machine Co., Hyde Park, Pa., adds that demand for steel mill equipment and other iron castings continues good. Other equipment suppliers say that the slowdown in the steel operating rate during recent weeks has lowered demand from last year's frantic peak to a more normal, strong level.

Suppliers to automakers continue to experience slack business. A large producer of automotive dies has completed its production of dies needed for 1958 cars and will have a seasonal slowdown for several months until production is started on dies for 1959 models.

Thomas Kaveny Jr., president, Herman Pneumatic Machine Co., Pittsburgh, says backlog of orders for molding machines is growing, with numerous orders developing from foreign countries.

Suppliers of equipment to automotive foundries say that sales continue slack. Other equipment buyers are boosting their orders.

***Chicago***— Plant visitations in foundries are nothing new. Many shops maintain an open-door to visitors at all times; others set aside special days each year or two for residents of the community and families of workers to inspect their facilities and operations. And some arrange special open-houses at which the management is host to invited business people. As common as these affairs have become in furthering community and public relations, new ideas for their conduct still spring up from time to time to guide us.

For example, a gray iron and malleable foundry in northern Indiana figured there might be considerable educational value in showing business leaders how castings are made and what they are used for. Consequently, on Wednesday afternoons when most stores and offices were closed, it began the practice of inviting 15 or more people to a luncheon at a local restaurant and afterward conducting their guests through the foundry in the afternoon.

There was nothing novel about this arrangement, except that the management made it a point to see that the barbers in the town were among those attending the first parties scheduled. Management of the foundry figured the word of their undertaking would get around fast this way and maybe the story of castings would make just as good barber shop conversation as baseball, horse racing, or what have you.

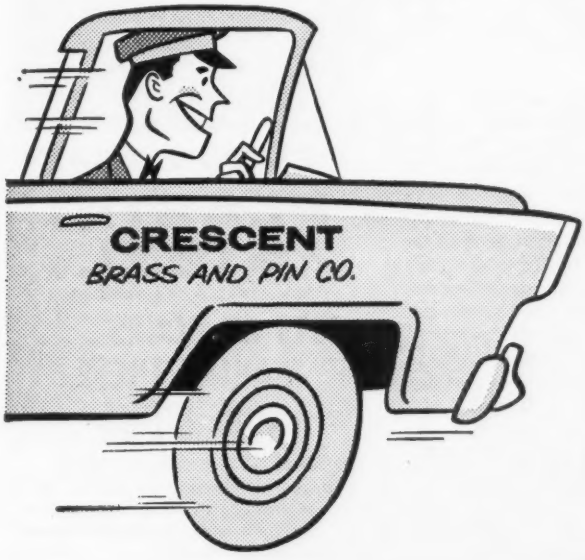
CHILEANS IN U.S.: A Chilean foundry productivity team touring the United States discussed nonferrous castings on March 9 at a meeting arranged by the Non-Ferrous Founders' Society, Chicago. In the front row, left to right, are Miss Barbara Huntly, translator; Elmer Brumund, Brumund Foundry, NFFS director; H. A. White, Smeeth-Harwood Co., past president, NFFS; Jose Leal; Jaime Claramunt; and Darlene D. McDermott, assistant secretary-treasurer, NFFS. Back row, left to right: Miguel Allamand; Ted Anderson, Arrow Pattern & Foundry Co.; Hernan Cabrera; Guillermo Rosenberg; Francisco Fuente; Miguel Raab Jeanneret; and Eugenio Diaz. The team also visited other cities during the tour

***Philadelphia***— Gray iron casting demand is lagging. Most jobbing shops are less active than a month ago. Few, if any, are operating full time at more than four days a week and some are on a still lighter schedule. Where shops are operating five days a week, they are doing so with restricted forces. Backlogs average about two weeks, with orders for heavy castings more extended than for the light.

With housing starts well down from a year ago (estimates for this year are now 800,000 to 900,000), cast pipe and sanitary ware producers are operating at around three or four days a week, with substantial inventories.

Steel casting production has dropped slightly, but producers are still busy. They are working a full five-day week and backlogs average around five weeks. Ship demands are figuring substantially in the operations of some of these shops. Malleable business is moderately good, probably ranking second to steel castings in relation of output to capacities. Producers of pipe fittings

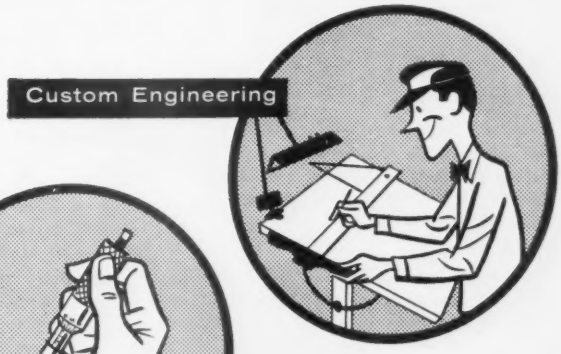
# service

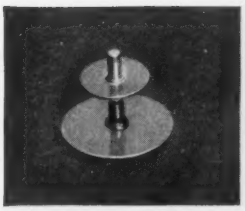



**Our 67 years of serving** the needs of industry have taught us that service means different things to many people. For instance, many foundry operations rely on our complete, convenient stock of chaplets. Others have come to know that our custom design facilities stand ready to answer their particular needs. And no job is too large or too small . . . chaplets are our business.

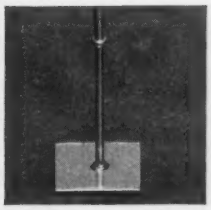
But you might say the "pay-off" for those customers has been our reputation for precision tolerances which form the foundation of every chaplet we design and manufacture.

Let us prove 67 years of experience right in your own foundry. Get to know the advantages of our superior reputation, facilities and service. Your products will reflect the benefits of this superiority.

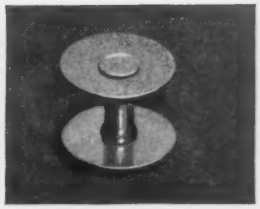




double head extended stem chaplet

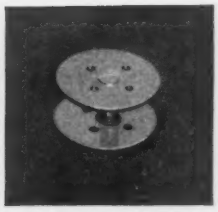


shoulder chaplet



boiler chaplet

radiator chaplet



perforated double head chaplet

## CRESCENT BRASS & PIN CO.

5766 Trumbull Ave., Detroit, Michigan



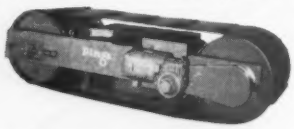
Circle 667 on Inquiry Card—Page 51

## What You Can Do To Cut Production Delays

- *Stop Downtime Caused by Tramp Iron Damage*
- *Reduce Sand Preparation Costs*
- *Speed Handling of Scrap, Pig Iron, Hot Castings*

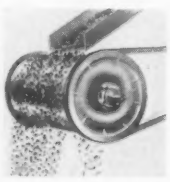
ARE production delays taking a big bite out of your profit? By using modern magnetic separation techniques, foundrymen are holding slowups . . . and thus production costs . . . to the minimum.

There are three good ways to reduce production delays. *First*, cut downtime caused by tramp iron damage to machines and equipment.



Dings "In-Line" Self-Cleaning Rectangular Magnets automatically pull iron out of the deepest burdens on high-speed belts. Extraction of iron is parallel to belt travel and at the same speed, permitting removal of long pieces before the trailing edge can rip the belt.

*Second*, use Dings non-electric Perma-Drums for low-cost removal of iron from sand in locations where other types of magnetic separators are impractical . . . below chutes or spouts, and in sand preparation equipment. Use Perma-Drums also for final removal of small iron fragments that may get by the first separation of shake-out sand, and thus delay production.



*Third*, you can save manpower and speed the handling of scrap, hot castings, charging cupolas, or moving pig iron. Dings cool-running Lifting Magnets can be profitably used wherever a dependable, long-lasting "weight-lifter" is needed.

Other Dings Magnetic products can help you save wasted time and money in your foundry. For details, write to

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*Circle 673 on Inquiry Card—Page 51*


and small hardware appear to be averaging fairly well, despite a certain spottiness.

A number of nonferrous jobbing foundries are down to three days a week; those doing better are operating with light working forces. Demand for plumbing supplies and meters is slow. Industrial valve and pump requirements are off. Only in ship work does there appear to be any strong demand, and much of this still seems restricted to captive shops.

***Penn State***— An extensive program covering a broad range of subjects has been announced for the three-day foundry conference to be held at Pennsylvania State University, University Park, Pa., June 20-22.

The first of its kind to be held on the campus, the meeting is designed to provide worthwhile discussions for the operating foundryman. Men well qualified to discuss the practical phases of foundry practice relating to both ferrous and nonferrous castings have been selected as speakers.

In addition to the university, the conference is being sponsored by the American Foundrymen's Society, the Foundry Educational Foundation, the Foundry Equipment Manufacturers Association, and 13 independent foundry groups and AFS chapters of eastern United States and Canada.

William B. Wallis, Lectromelt Furnace Division, McGraw-Edison Co., Pittsburgh, is chairman of the conference committee. He will be assisted by C. W. Mooney, Link-Belt Co., Philadelphia, vice chairman; W. P. Winter, Penn State, secretary; H. P. Good, Textile Machine Works, Reading, Pa., treasurer, and E. J. Biller, Vulcan Mold & Iron Co., Latrobe, Pa., program chairman.

Ample housing accommodations on and near the campus will be available for visitors. Charge for the conference will be $15, including registration fee, instructional materials, two banquets, and one luncheon. Various recreational facilities, including golf, tennis and swimming, will be offered, and several activities during the conference have been planned for wives accompanying their husbands.

Additional information concerning the meeting and accommodations can be obtained from T. Reed Ferguson, Extension Conference Center, Pennsylvania State University, University Park, Pa.

The tentative program follows:

**Thursday, June 20**

**8 a.m.—Registration**

**12:15 p.m. — Luncheon:** Chairman, W. B. Wallis, Lectromelt Furnace Division, McGraw-Edison Co., Pittsburgh.

**1:30 p.m.—Sectional Meetings**

Steel: Chairman, R. H. English, Blaw-Knox


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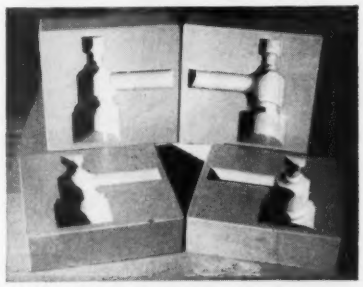

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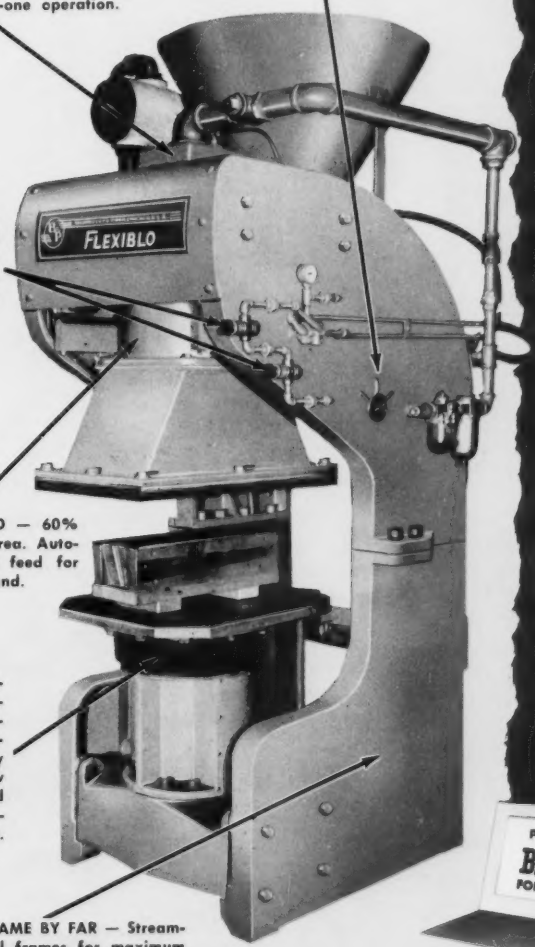


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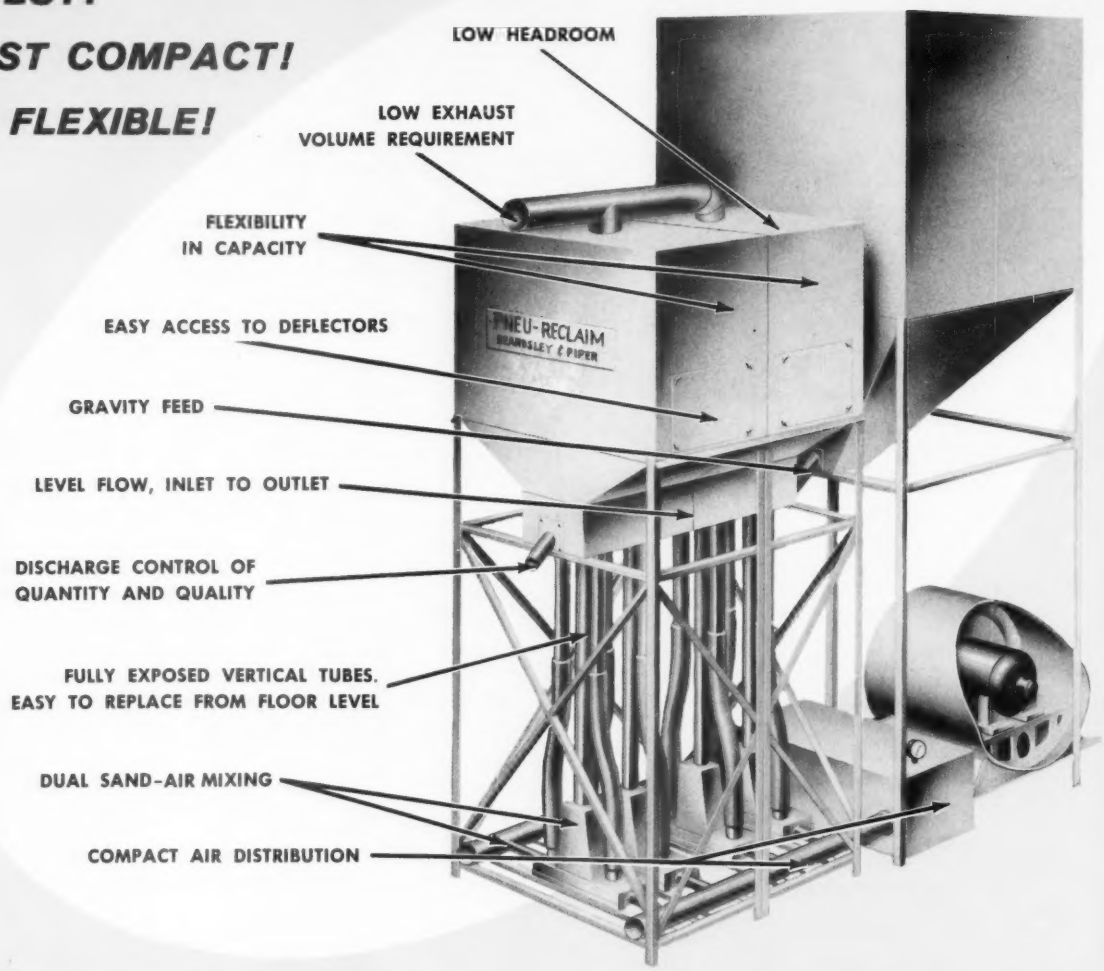


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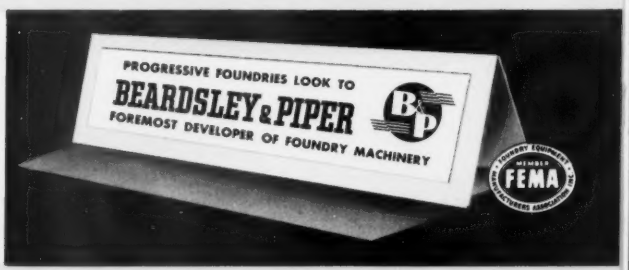


Co., Pittsburgh; Co-chairman, Dr. R. W. Ziliman, Pittsburgh Steel Foundry Corp., Glassport, Pa. **Cold Set Process Applied to Steel,** Frank H. Dettore, Glen E. Smith Co., Pittsburgh. **$CO_2$ Process for Steel Cores,** Roundtable Discussion. **Report on Shell Molding of Steel Castings,** Frank Less, Durez Plastics Division, Hooker Electrochemical Co., North Tonawanda, N. Y. **Sand Control for Green Sand Practice in the Steel Foundry,** Frank Youngworth, Foundry & Mill Machinery Division, Blaw-Knox Co., Coraopolis, Pa.

Gray Iron: Chairman, C. W. Mooney Jr., Olney Foundry, Link-Belt Co., Philadelphia. **Producing What Your Customers Want,** Charles Walton, Gray Iron Founders' Society, Cleveland. **The Gray Iron Foundry Looks to the Future,** Richard Meloy, Gray Iron Founders' Society, Cleveland. **Reduced Cost through Good Cupola Control,** W. W. Kerlin, Meehanite Metal Corp., New Rochelle, N. Y.

Nonferrous: Chairman, William A. Mader, Oberdorfer Foundries Inc., Syracuse, N. Y. **Canadian Light Alloy Foundry Practice and Technical Problems Encountered in Casting Magnesium-Thorium Alloys,** L. G. Day, Light Alloys Ltd., Haley, Ont. **Aluminum Foundry Practice,** W. E. Sicha, Aluminum Co. of America, Cleveland. **Modern Gating and Risering of Nonferrous Alloys,** R. A. Colton, Federated Metals Division, American Smelting & Refining Co., Newark, N. J.

Malleable: Chairman, C. O. Williamson, Grinnell Corp., Providence, R. I.; Co-chairman, Thomas M. Blank, Pennsylvania Malleable Iron Corp., Lancaster, Pa. **General Melting Practice in Malleable Iron,** Joseph Dvorak, Eberhard Division, Eastern Malleable Co., Cleveland. **General Annealing and Pearlitic Practice,** Lyle R. Jenkins, Wagner Malleable Iron Co., Decatur, Ill. **Scrap Reduction Program,** Henry Felten, Peoria Malleable Casting Co., Peoria, Ill.

**6:30 p.m. — Banquet:** Toastmaster, W. B. Wallis. Speaker, Dean Merritt A. Williamson, Pennsylvania State University.

**Friday, June 21**

**9:30 a.m.—Sectional Meetings**

**Steel: Sand Reclamation for the Steel Foundry,** R. L. McIlvaine, National Engineering Co., Chicago. **Recent Developments in Molding in the Steel Foundry,** Dr. David C. Ekey, Lebanon Steel Foundry, Lebanon, Pa. **Modern Steel Melting Practice,** F. E. Van Voris, Electro Metallurgical Co., New York.

Gray Iron: **Recent Foundry Developments with Respect to Quality Control of Gray and Ductile Iron Castings,** T. W. Curry, Lynchburg Foundry Co., Lynchburg, Va.

Nonferrous: **Vacuum Degassing of Nonferrous Metals,** E. A. Lange, Naval Research Labortory, Washington. **High Purity 355 and 356 Alloys,** Alan B. DeRoss, Kaiser Aluminum and Chemical Sales Inc., Oakland, Calif.

Malleable Iron: **Stress Analysis Use,** R. L. Gilmore, Superior Steel & Malleable Castings Co., Benton Harbor, Mich. **Nodular Iron as an Engineering Material,** T. E. Eagan, Cooper-Bessemer Corp., Grove City, Pa.

**12 Noon—Luncheon**

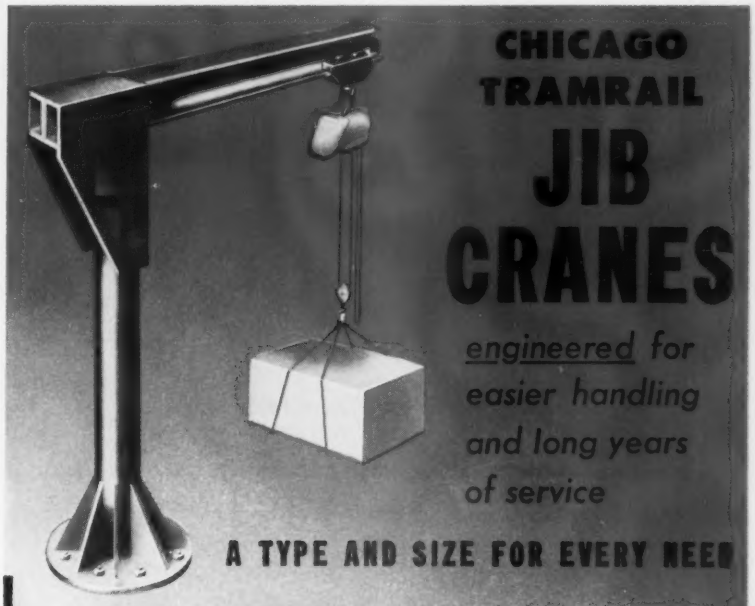
**1 p.m.—Sand School:** Chairman, William H. Ruten, Polytechnic Institute of Brooklyn. Co-chairman, W. P. Winter, Pennsylvania State University. **Principles of Molding and Core Sand Technology,** Clyde A. Sanders, American Colloid Co., Chicago, and O. Jay Myers, Reichhold Chemicals Inc., White Plains, N. Y.

**6:30 p.m. — Banquet: Pennsylvania Dutch Humor,** Dr. A. F. Buffington, Pennsylvania State University. **The American Foundryman, 1957 Model,** James H. Smith, General Motors Corp., Saginaw, Mich.

**Saturday, June 22**

9 a.m.—Sand School: **Foundry Sand Testing and Control,** Victor Rowell, Harry W. Dietert Co., Detroit.

9 to 11:30 a.m.—Special session, "Mechanization." Chairman, E. C. Troy, foundry engineer, Riverton, N. J. **Automation of the Sand System,** J. E. Micksch, JEM Laboratories Inc., Ashtabula, O.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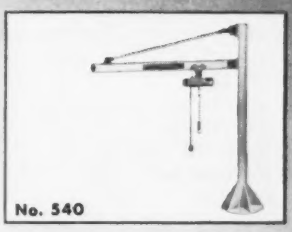


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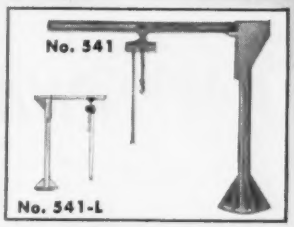


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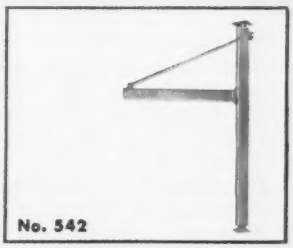

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# TECHNICAL DEVELOPMENTS

## *Are Reported at AFS Congress*

THE conventional piston engine will continue to be the principal type of automotive power plant for many years to come, although active experimental work is being conducted on the gas turbine and other units. This forecast was made by H. F. Barr, chief engineer, Chevrolet Motors Div., General Motors Corp., in addressing a general session the opening day of the AFS Casting Congress in Cincinnati.

Trucks and buses, he said, will be the first vehicles to which the gas turbine will be applied.

**It's the Part that Counts**—Automotive designers are impartial in their selection of a material and its processing method for a given part, according to Mr. Barr. The designer's primary interest is in the finished part, and he wants the best one obtainable at the lowest cost.

In castings the designer seeks thinner wall sections, fewer internal stresses, closer dimensions, improved surface finish and minimum or no draft. In development of a part's design it is important that the foundry participate in early planning.

**Aluminum Use To Grow**—Mr. Barr indicated that the recent trend toward greater use of aluminum castings in production of autos will continue. While consumption of ferrous castings per car may decrease, total needs will grow because the auto industry will continue to expand. The first 10-million-car year should be experienced by 1970, the speaker said.

Extensive use is made of aluminum in the Chevrolet automatic transmission. For the case of this unit's valve body, however, the expansion characteristics of gray iron have made it the preferred material. It is made to a tolerance of $\pm 0.002$ in.

## *PATTERNMAKING*

PLASTIC PATTERN EQUIPMENT was the big subject on the pattern program, which included three technical sessions and a luncheon. Two of the three sessions dealt exclusively with various aspects of plastic pattern and corebox manufacture.

**Metal Corebox Equipment**—W. E. Mason, Westinghouse Air Brake Co., Wilmerding, Pa. Metal pattern and corebox equipment costs are justified by their ability to reduce manufacturing cost and increase production. Formerly restricted to production work, such equipment is coming into increasing use as a means of producing dimensionally accurate castings at the lowest possible labor cost, thus permitting castings to compete with other forms of fabrication. Metal equipment must be made with great care to eliminate reworking because such corrections can involve a greater expense than the original work.

Where production is to be high, blown-in drier equipment in which cores are blown directly into the drier, which serves as the bottom half of the corebox, permits making cores 50 per cent cheaper.

**Engineering Aids for Sealing Coreboxes against Blowbys**—R. L. Olson, Dike-O-Seal Inc., Chicago. Blowby in coreboxes causes wear, results in poor cores and wastes compressed air and core sand. In addition, it is dangerous, particularly to the eyes.

Many attempts have been made to prevent blowby, but most efforts only create new problems. These attempts have included greater closing pressure, rubber compression seals, vents, calking and other measures, each of which had its own disadvantages. A new type of spongy rubber seal is built into the corebox, the rubber on one half fitting into a channel tooled into the other half. This arrangement permits metal-to-metal contact at all times. The seal design varies in differing types of coreboxes, and venting, blow pressure, etc., are adapted to individual boxes.

**Cast Epoxy Pattern Equipment**—J. B. Templeman, Templeman Pattern Works, Chicago. Manufacture

A large audience heard H. F. Barr, General Motors Corp., at a general session

of cast epoxy pattern equipment requires mastery of proper techniques, which are acquired slowly, but are not actually difficult.

A plaster slurry is poured around a wood original, which is removed after the plaster has set. If the pattern is large or has sections over ½ in., a wood skeleton or lightener can be used to cut down section size and prevent exothermic reactions during curing of the plastic.

The epoxy pour is started, then stopped while bubbles are brushed out. The brush never is lifted from the mold during the operation since lifting it out would introduce air into the plastic mixture. Bubbles must be kept to a minimum. Pour then is continued, and the filled mold is weighted and permitted to cure.

A typical large pattern used with a slinger requires no repair after 1000 molds have been made from it. Coreboxes run from 25,000 to 100,000 units and some have produced as many as 225,000 units with only 10 hr downtime. Pattern equipment will do as well with reasonable care.

It is important to remember that different jobs call for different formulations. Plastics do a fine job with low maintenance, and repair and redesign work can be done easily.

**Plastics in Pattern Making**—H. A. Burton, Canadian Steel Foundries Ltd., Montreal, Canada. Epoxy resin plastics make possible fast, economical construction of patterns and coreboxes. Their advantages include good bonding qualities, dimensional stability, high compressive strength, impact resistance, wetting ability, chemical resistance, high flexural strength, high abrasive resistance, easy release from molding sand and reduced weight in multiple coreboxes. A variety of formulations may be compounded, each suitable for a particular type of application. For details on this paper, see "Plastics in Patternmaking," by H. A. Burton and Paul von Colditz, FOUNDRY, December, 1956, p. 98.

**European Foundries and Pattern Shops** — E. T. Kindt, Kindt-Collins Co., Cleveland. Pattern shops in Belgium and Holland are small and not modern. In France, the shops at the Citroen and Renault automotive companies are modern and efficient, as are many of the German establishments, too. Captive shops are in the majority—one report is that there are only 25 pattern shops with more than 25 men in Western Europe. Workmanship is of high quality, but facilities are not. Some woodworking equipment is, however, superior to that in use in America.

Apprentice programs receive much more emphasis in Europe than in the U.S.A., and high-caliber men are readily available. Patternmaking is a highly regarded occupation, although wages are low compared with American standards. Pattern shop supervisors at the Krupp plant in Essen, Germany, make only 75 cents an hour.

**Wear Characteristics of Plastic Pattern Materials**—M. K. Young, U. S. Gypsum Co., Chicago. Wearability characteristics of wood, aluminum, and epoxy plastic patterns and coreboxes were compared. Qualitative and quantitative tests on various formulations of plastic and filler materials indicate that glass mill fiber fillers used in poured patterns give the best wear. In laminated pattern construction the use of half resin and half glass fiber cloth gives good results. Laminates, however, should be no more than ¼-in. thick.

Pattern construction should include mechanical mixing of the plastics to avoid soft spots in the pattern. Also, metal wear pads should be inserted in those parts of the pattern which come in contact with molding flasks.

One of the newer techniques for making plaster coreboxes involves the hand ramming of a moistened filler material over a pattern. The pattern is drawn and the green box is placed in an oven for a short time. Then the box is removed and placed in a shallow pan containing liquid plastic and the assembly returned to the oven. The liquid plastic is drawn up into the filler material where it sets to form a hard wear-resistant box. Surplus liquid plastic remaining in the pan may be reused.

**The Patternmakers Application of Plastics in Industry** — J. F. Roth, Cleveland Standard Pattern Works, Cleveland. Opportunities for patternmakers to make plastic equipment for the aircraft, automotive, rubber, and other industries were described briefly.

Members of a panel answering questions included Joseph W. Tierney, Houghton Laboratories Inc., Olean, N. Y.; T. O. Mahaffey, Kish Resin Sales Co., Cincinnati; M. K. Young, U. S. Gypsum Co., Chicago; W. J. Olsen, U. S. Naval Shipyard, Bremerton, Wash.; H. A. Burton, Canadian Steel Foundries Ltd., Montreal, and J. B. Templeman, J. P. Templeman Pattern Works, Chicago, with Mr.

Roth as moderator of the panel.

Answers to questions indicated that: Worn coreboxes, patterns, and other equipment may be reproduced readily with plastics. In making plastic-glass cloth laminates, air bubbles can be eliminated by brushing or by vibrating the equipment while liquid plastic is being poured. Heat treating of plastic patterns at about 250°F will hasten the aging process of plastic and will improve strength beyond the maximum obtained by air curing in eight days. The purpose of an aluminum powder filler is to give plastic patterns ductility and reduce chipping. Indecision still exists as to whether aluminum filler improves heat transfer characteristics of unfilled plastics.

# MALLEABLE IRON

FIRST of two sessions on malleable iron dealt with three different phases—properties, furnace control and embrittlement.

Report of Pearlitic Malleable Committee E-6 on **Comparison of Properties of Liquid- and Air-quenched Pearlitic Malleable Irons** was presented by Prof. Richard W. Heine, University of Wisconsin, Madison, Wis., and contained information obtained from eight foundries producing alloyed and non-alloyed pearlitic malleable by the cold-melt process. This report supplements one given last year wherein similar data were obtained from foundries using the duplex process.

Some conclusions from the data are that hardening by liquid quenching and then drawing is a successful means for producing ASTM grades 60003 and 80002. Air quenching and drawing is being used to produce ASTM 60003 and lower-yield-strength grades 53004, 48004 and 45007. Liquid quenching and drawing produce higher yield strength at a given hardness level than air quenching and drawing. Maximum elongation is obtained at any hardness in low carbon and low silicon irons and in manganese-alloyed irons.

Grades of pearlitic malleable listed in ASTM specifications agree very well with tensile strength, yield strength, hardness and elongation relationships reported by the several foundries using both melting processes.

**Combustion Controls in Duplex Air Furnace Practice**—Larry E. Emery, Marion Malleable Iron Works Division, Chicago Railway Equipment Co., Marion, Ind., described application of a continuously recording gas analyzer to air furnace operation in a duplex cupola-air furnace combination. A water-cooled sampling tube located over the bridge wall draws gases from the air furnace atmosphere which are analyzed for oxygen and combustible matter in the recording gas analyzer.

Through manual adjustment of powdered fuel burners and admission of secondary air, the furnace atmosphere is controlled to meet predetermined ranges on oxygen and combustibles. Controlled furnace atmosphere, according to Mr. Emery, permits better control of iron composition and subsequently better castings. He also indicated that controlled furnace atmosphere conditions during preheating of newly-lined furnaces appeared to give a better refractory life.

In reply to a question, the author said that location of the sampling tube over the bridge wall resulted from a survey of different positions and gave consistent data. Range of gas analyses was determined experimentally. He mentioned that the gas analyzing unit also was designed to control fuel burners and secondary air, but as yet that phase was not in operation. This step will be taken in the near future and control of the furnace atmosphere then will be automatic.

**Some Observations on Galvanizing Embrittlement of Malleable Iron**—R. W. Sandelin, Conners Steel Division, H. K. Porter Co. Inc., Birmingham, Ala., pointed out that galvanizing embrittlement is related directly to phosphorus and silicon contents. Increasing phosphorus for a given silicon content will change a non-susceptible iron to a highly susceptible one. Pretreatment by heating the castings to 1200°F and water quenching prior to galvanizing eliminates embrittlement. Slow cooling after galvanizing without pretreatment tends to reduce embrittlement. Impact tests are reliable for evaluating embrittlement.

The author stated that metallographic examination does not reveal any microstructural differences between normal and embrittled iron, and that any changes in structural composition must be submicroscopic in character.

First of three papers at the concluding Malleable Division session was **Effects of Charge Materials and Melting Conditions on Properties of Malleable Iron** by E. H. Belter, metallurgical engineer, Bechtel Corp., San Francisco, and R. W. Heine, associate professor, University of Wisconsin. It was presented by Prof. Heine. This is the sixth annual report on the AFS malleable research project, which is concerned with several subjects in addition to the one reported on here.

Effect of pig iron in the charge has been shown to be related to changes in chemical composition which accompany its use and its resistance to oxidation under oxidizing melting conditions other than free oxygen. Mixed charges containing pig iron were shown to cause uniformly good first and second stage annealability. Recovery of residual elements from the pig iron was found to be virtually independent of the degree of oxidizing or reducing melting conditions prevailing.

No correlation of residual element percentage to any property of malleable iron could be discovered. Melting conditions appear to exert a stronger effect than residual elements. Since the pig iron is not easily oxidized, it has the effect of diminishing any oxidizing melting conditions that may prevail.

**New Foundry Testing Methods,** by C. A. Koerner, Central Foundry Division, General Motors Corp., Saginaw, Mich., illustrated how electronics, ultrasonics and atomic energy can be applied to check casting quality. The company uses radioactive cobalt extensively in development of gating practice and in checking riser efficiency. Magnetic particle and black light inspection methods are employed to detect surface defects.

High-speed testing of certain parts is accomplished by an automatic device incorporating an electronic "ear" which listens to the sound produced when a clapper strikes a casting. The unit discards those castings containing defects which cause the wrong pitch to be emitted. This process is especially suited to high-production work.

Another high-speed device checks hardness of rocker arm castings ten times as fast as can be done manual-

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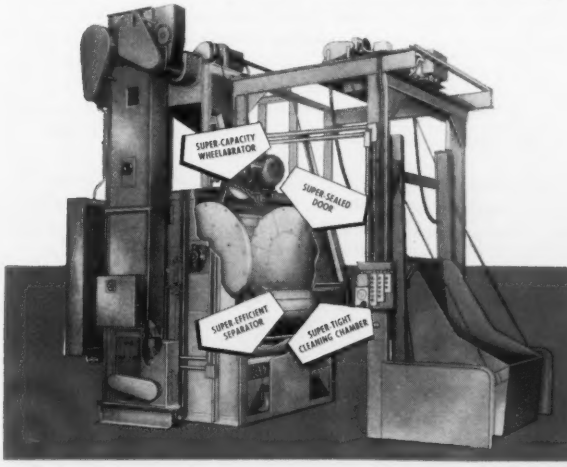


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ly with an impression type machine. It is based on the fact that magnetic retentivity of the part is a function of its combined carbon. The castings are magnetized as they are dropped through a tube, and the unit automatically sorts out those which do not have the required hardness.

Other testing methods employed include use of ultrasonics for checking critical areas of certain castings, and a metals comparator test. The latter, a relatively inexpensive device, can be used to detect mottled iron. A sound casting is used as the core of a simple transformer hooked up to another transformer in which the casting to be tested is the core. In the absence of a flow of current the tested casting is acceptable.

**Investigation of Effect of Processing Variables on Properties of Pearlitic Malleable Iron,** by H. H. Johnson and W. K. Bock, National Malleable & Steel Castings Co., Cleveland, was presented by Mr. Johnson. This study sought to determine how the tensile and yield strengths, elongation, and hardness of pearlitic malleable were influenced by variations in 1) heat treating atmosphere, 2) quenching temperature, 3) quenching rate, 4) tempering temperature, 5) tempering time, and 6) surface of the test bar. Melting variables were not covered in this investigation.

The tests indicated that there is an important interrelation between variations in quenching time and temperature, and that quenching rate is of greater influence than temperature of the quenching medium. Relatively little importance was attached to variations in heat treating atmosphere. Test bar surface had significant effect, better properties being obtained from machined bars than from as-cast bars.

**Castings from the User's Standpoint**—Defects provide the greatest sales resistance the foundry industry encounters, according to Thomas Logan, Caterpillar Tractor Co., Peoria, Ill. Speaking at the Malleable Division's roundtable luncheon, he pointed to the lack of weldability and occasional absence of uniformity malleablizing in heavy sections as additional deterrents to greater use of malleable castings. He urged the industry to adopt better control and inspection methods in its efforts to improve product quality and prevent defective castings from reaching consumers. Mr. Logan described various tractor parts which had been converted to malleable castings, and suggested that foundries intensify their efforts to develop similar conversions for other products.

# STEEL CASTINGS

TWO technical sessions and a roundtable luncheon comprised activities of the Steel Division.

First of three papers at the opening session was **Welding Steel Castings with Carbon Dioxide as a Shielding Agent,** by J. J. Chyle, A. O. Smith Corp., Milwaukee. Use of $CO_2$ is one of the most noteworthy developments in welding in the last ten years. Its use reduces cost, gives high-quality weld metal, no flux is needed, and it is adaptable to both manual and automatic welding. The welding head is water cooled.

Dissociation of $CO_2$ is as follows: $2CO_2 \rightleftarrows 2CO + O_2$ . $CO \rightleftarrows C + O$. The free oxygen combines with the silicon in the welding rod or wire quicker than the iron in the base metal being welded, consequently the iron remains free from contamination by oxide. Only 30 cu ft per hr of $CO_2$ is required for shielding, compared with 60 cu ft per hr of argon and 70 of helium. Furthermore, $CO_2$ costs only one-ninth as much as argon and one-sixth as much as helium.

The $CO_2$ shielding process seems to have its biggest use in the salvaging of steel castings. It can be used equally well for low, medium and high carbon analyses. Weld metal has excellent physical properties. It was emphasized, however, that the $CO_2$ must be welding quality, with the manufacturer guaranteeing low moisture content with a dew point of $-40°F$.

**Effect of Carbon and Manganese on Properties of Constructional Steels for Dynamic Loading Applications,** by R. D. Engquist, senior research metallurgist, Manufacturing Research Laboratory, American Steel Foundries, East Chicago, Ind. The railroad, automotive, mining, maritime and heavy machinery industries are big users of steel castings which are subjected to severe loading. The bulk of these castings is AAR Grade "B" steel. This investigation was undertaken because of numerous failures of this steel in railroad service, particularly during cold weather.

Research proved that manganese contents in excess of 1.10 per cent are not deleterious if the carbon content is reduced to approximately 0.18 per cent. In fact, the studies and parallel work by other institutions on similar problems prove that advantages gained by use of a higher-manganese, lower-carbon alloy composition far outweigh the disadvantages of by-gone years. Specification-writing bodies should give modern reappraisals to details of existing specifications which have become obsolete through advances in processing technology.

Benefits to the customer which could be obtained by utilization of a steel of this composition include: 1) Increased resistance to brittle fracture through improved impact characteristics and reduced possibility of hot tears in castings; 2) surface hardening of areas of local wear would be more effective than with ordinary Grade "B" steel; 3) ready weldability for cast-weld fabrication of members.

Benefits to the foundryman include: 1) Reduced susceptibility to hot tearing; 2) decreased likelihood of service failures because of lower probability of undetected hot tears and mechanical properties and impact characteristics; 3) ready weldability and ease of defect repair.

**Hydrogen As It Affects Steel Castings,** by A. E. Gross, Ohio Steel Foundries, Springfield, O. Specifications for castings are becoming more difficult, and a good casting yesterday may not be a good one today. Hydrogen comes from dissociation of water in the furnace atmosphere, it can also be picked up in the ladle unless additions to the metal are dry, and it may come from the mold itself.

**Roundtable Luncheon**—Turnout for the Steel Division roundtable luncheon was the biggest in recent years—about 145—a showing which division leaders attributed to the fact that the event was held at the beginning of the week instead of the end as customarily.

Retiring chairman of the Steel Division, Victor E. Zang, vice president in charge of research, Unitcast Corp., Toledo, Ohio, announced that A. J. Kiesler, research metallurgist, General Electric Co., Schenectady, N. Y., will succeed to the chairmanship. New vice chairman will be Donald N. Rosenblatt, metallurgist, American Machine & Foundry Co., Salt Lake City, Utah.

**Do the New Processes Work For You?** was the discussion topic and

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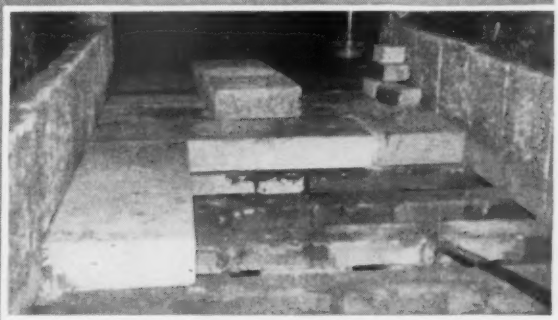

Installation of Walsh C-64 tile, (4" x 12" x 24".)

Furnace loaded with automotive connecting rod caps—May, 1956.

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| **Previous Service** | 8 weeks—with high duty grade refractory tile |
| **Load on Hearth** | 2 to 3 tons |
| **Type of Ware Treated** | Automotive Connecting Rod Caps |
| **Other Operations** | Hardening Operations for Large Castings as well as Annealing and Normalizing of Forged Parts. Die Blocks. |
| **Length of Cycle** | 24 hour cycle. 6 day week. |

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chairman C. B. Jenni, General Steel Castings Corp., Eddystone, Pa., elicited good participation in open discussion.

The initial subject was ladle practice and alumina refractories. Battelle Memorial Institute, Columbus, Ohio, has analyzed some ladle impurities with the spectrograph and found they were calcium and magnesium oxide. Their source could be only one place—the furnace lining. It was pointed out, however, that such oxides also could come from ladles. One investigator mentioned finding manganese oxide in metal impurities. Some felt faulty gating systems are responsible for such impurities getting into the metal.

How long should a ladle last? This question brought an answer from one individual of between 500 and 600 heats on a chrome-magnesite lining.

Another question was: Why isn't it possible to make castings acceptable as to finish and tolerances in green sand? It was mentioned that some specifications call for finer finishes than foundrymen can supply. Cited as an example is a current casting requirement that calls for a finish of 250 microinches. It was stated that this requirement can't even be met in shell molded castings.

Defects attributed to hydrogen are two fold—the permanent type such as blowholes, porosity, etc.; and the temporary type such as loss of ductility, etc. The former are serious, the latter are not. Diffusion of hydrogen into the steel at high temperature and high pressure, for example, does not affect the casting, according to the author. This diffusion happens frequently in chemical industry service. Impact strength in the diffused condition varies little from that measured after dehydrogenization. The permanent defects, which are serious, the foundryman can control only through the melting and pouring practice.

Discussion revealed there are no mold materials of sufficient fineness to give such a finish and grinding and buffing is the only way to obtain it. This procedure is time-consuming and expensive, and it was emphasized by one discussion participant that if such a finish actually is required, the customer should be told what he will have to pay for it.

Concerning new molding techniques, several commented that they are troubled with shrinks in using the $CO_2$ process. As to cleaning room practice, there was agreement that the air-electric arc is a good tool when used properly. It is economical —one company saves 23 per cent over grinding in pad washing.

The second steel session opened with a paper **A Review of Steel Foundry Literature from Behind the Iron Curtain,** by A. J. Kiesler, research laboratory, General Electric Co., Schenectady, N. Y. Russia has a tremendous organization for fast translation of technical information. To illustrate, Mr. Kiesler said that the AFS *Transactions* most certainly will be translated and available within three months after their issuance here.

Among Russian processes of interest is one in which molten cast iron is poured on water-cooled rolls and rolled into sheets. Being brittle, these sheets are annealed, then are cut up to make roof shingles. Russia is not one bit behind the United States in foundry practice, it was pointed out.

The speaker outlined how Russia trains its engineers and technicians. A foundry metallurgist is paid about 20 times the wages of a laborer. The normal work week in the USSR is 48 hours, but shorter for hazardous occupations such as mining.

Mr. Kiesler abstracted a translation from Russian describing use of the $CO_2$ process. Upwards of 90 per cent of core hardening in Russia is done by this process.

**Grain Refinement of Stainless Steel Castings,** by J. L. Walker and A. J. Kiesler, research laboratory, General Electric Co., Schenectady, N. Y. In the casting of large turbine shell castings the problem of very large grain structure was encountered. Through inoculations, satisfactory grain refinement was accomplished. The nature of the inoculations could not be revealed for patent reasons but that information will be released shortly. The point of interest is that with the procedure described in the paper, castings sections ranging from ⅛ in. to 12 in. thick were refined satisfactorily.

Inoculation will help to make salable castings that otherwise could not be made to certain specifications. At the same time, grain refinement in itself does not give better physical properties but there is a correlation between the two.

**Austenitic Manganese Steel Technology in an Australian Foundry,** by Hedley Thomas, chief metallurgist, Industrial Steels Ltd., Sydney, N.S.W., Australia. This was the official exchange paper from the Institute of Australian Foundrymen (N.S.W. Division), and was presented in abstract by H. E. Cragin Jr., Taylor-Wharton Co., High Bridge, N. J.

Although the technology of austenitic manganese steel is well established and widely known, that does not guarantee that all steel sold as austenitic manganese possesses the true properties of that steel. The author once was asked by a mining company to suggest a steel for bucket teeth employed in a rock quarry. The obvious steel was austenitic manganese but this suggestion was vetoed by the field engineer who indicated a scrap heap of broken teeth from several sources, including overseas foundries.

Investigation revealed all manner of heat treatment defects, manganese contents as low as 8.6 per cent and carbon contents up to 1.7 per cent. It became apparent that, widely known as the technology might be, the previous suppliers did not or could not employ it. Its interest in austenitic manganese steel thus aroused, the author's company revised its production technology in respect to this steel and has since completed many contracts without a service failure attributable to steel quality.

The author detailed the melting, pouring, heat treating, cleaning and physical testing, of austenitic manganese steel castings. It was stated that "the ideal pouring temperature is considered to be in the region of 2800°F (1540°C) with somewhat lower temperatures for heavy section castings."

In discussing Mr. Thomas' paper,

Left to right at the brass and bronze breakfast are Bernard Ames, F. L. Riddell, R. B. Fischer, C. T. Koehler, John E. Gotheridge, H. L. Smith, H. C. Ahl, R. J. Keeley, Robert A. Colton, Harry M. St. John and William Romanoff

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S. L. Gertsman, Department of Mines and Technical Surveys, Ottawa, Ont., Canada, contributed some corroborating information. He described a study on austenitic manganese steel in which pouring temperature was varied but melting temperature was held constant at 1800°C. A fine grain structure was obtained at 1500° pouring temperature but the grain coarsened progressively when pouring temperatures were raised to 1600, 1700 and 1800°C. At 1800° grain boundary cracking occurred.

Following this study, melting temperatures were varied and pouring temperature was held constant at 1430°C. These experiments showed that superheating the metal didn't change the fine grain structure obtained at the constant 1430°C pouring.

In further discussion, it was brought out that in England and Australia the cleaning is done with the castings in the green condition.

# STATISTICAL METHODS

SEVEN PAPERS on the use of statistical methods for the foundry industry were presented at two well-attended sessions. Advantages of incorporating advanced statistical techniques into practical, effective control tools was the theme of the papers.

**Quality Control for the Foundry Foreman**—Jules J. Henry, Missouri Steel Castings Co., Joplin, Mo. Every foundry must have a quality control program of some kind to remain in business. Quality must be built into a product, not talked into it. Manpower, machines, materials and methods were offered as the four M's of quality, and various factors affecting each were discussed. Success of the quality control program depends upon corrective action taken when data shows quality is out of balance. Quality control program can be as small or as large as desired, but an essential element is the desire of the foundry foreman to want the program—for success it can't be jammed down his throat.

**Statistics at General Electric**—J. H. Davidson, General Electric Co., Schenectady, N. Y., presented by W. Jay Merrill, statistician, General Engineering Laboratory, General Electric Co., Schenectady, N. Y. Outline of the general organization and functions of the General Engineering Laboratory's statistical methods section. This section is a unit of the Engineering and Physics group and fulfills a service function to the company on a job order basis. Units within the section are labeled as new methods, performance analysis, administrative applications, experimental design and computer. Computers available to the section are able presently to handle almost all calculations.

**Administrative Engineering Applications of Statistical Methods**—J. L. Doltby, General Engineering Laboratory, General Electric Co., Schenectady, N. Y., presented by Mr. Merrill. Report on an analysis by mechanical means of 16-months' data from an operating department of the company to determine 1) the amount of engineering effort that should be applied to achieve proposed goals for the year, 2) the allocation of the engineering effort to achieve such goals, 3) the amount of direct materials to be purchased to maintain the activity and 4) the establishment of the time lag between the engineering effort and the request for materials and service. Data compiled were used as a tool to aid management decisions.

**A Foundry Application of the Master Control System**—N. P. Demos, Statistical Methods, General Electric Co., Schenectady, N. Y. Report on a master control system that has worked successfully in a GE gray iron foundry since 1953. The system is an integrated, plant-wide, statistical quality control system which detects in a pinpointing manner all out-of-control characteristics that contribute to scrap or rework. It was designed to be operated by manufacturing personnel. Each person in the manufacturing line operation has a master control; it analyzes statistically the performance of each quality characteristic for which he is responsible. This information is pyramided to comprise control sheets for higher levels of supervision.

**Quality Control in a Small Foundry**—J. J. Henry, Missouri Steel Castings Co., Joplin, Mo. Foundries of all sizes need a quality control program in order to make castings to the customers' specifications, to reduce the amount of scrap or rework and to make castings economically so that they may be sold at a profit in today's competitive market. Several kinds of quality control programs were discussed and methods of gathering and recording data explained. The most important part of any controlled program is how the data are used after they are recorded. Paying a bonus to workers for keeping foundry processes in control was suggested as a method for obtaining co-operation in the proper use of data.

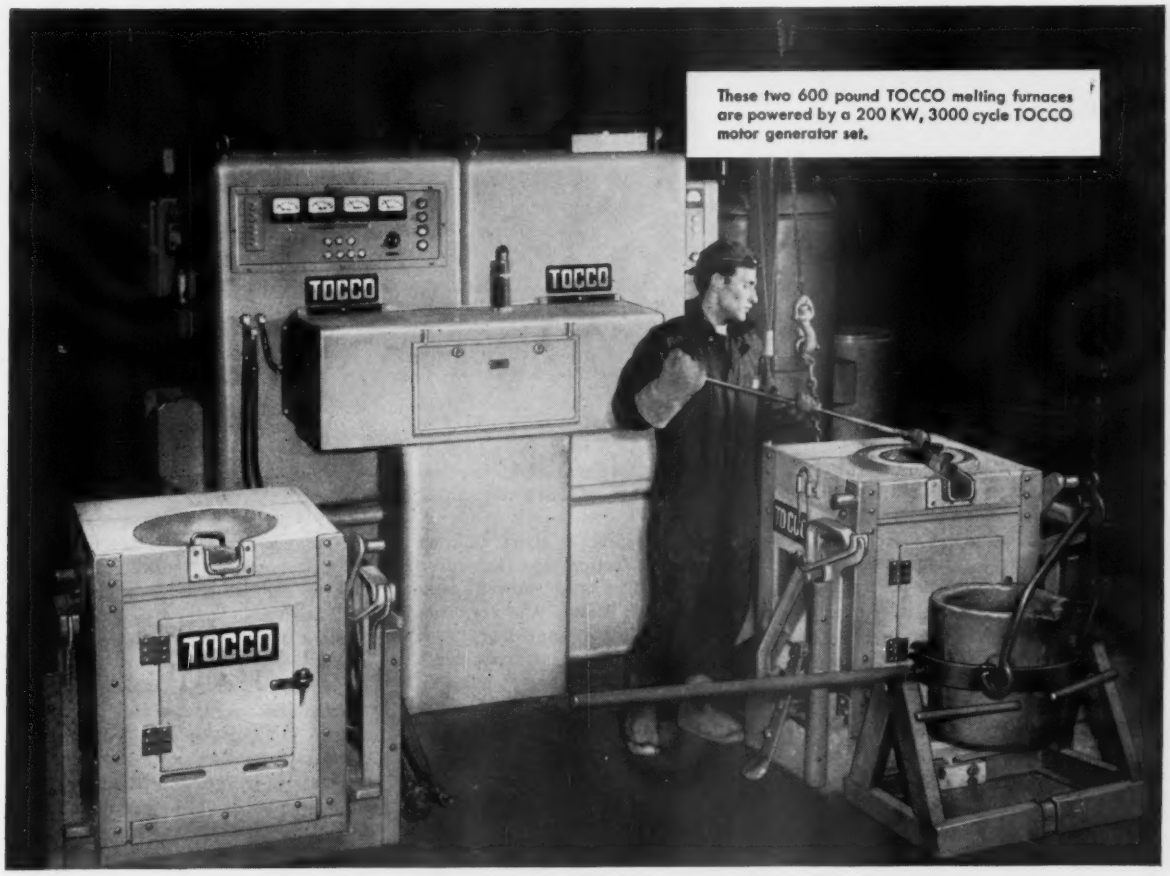
Control of quality will promote the confidence of industry in the ability of foundries to produce dependable engineered products. Poor quality performance by any foundry reflects adversely on the reputation and progress of the entire castings industry.

**Use of Fractional Factorial Designs in Sintering Experiments**—C. J. Davis and J. D. Hromi, United States Steel Corp., Monroeville, Pa. Presented by Mr. Hromi. In conducting a controlled comparative experiment the investigator has the choice of using the classical method of varying one influencing factor at a time or of varying more than one factor at a time. The second method, known as the factorial experiment, permits the use of all responses or values of the influencing factors in making each conclusion. It also provides the opportunity to see whether the effect or change in response due to one factor is the same or different for all levels of other influencing factors. Thus interaction effects of the influencing factors may be observed.

The techniques involved in conducting fractional factorial experiments were explained in detail. In brief, the method permits developing controls over processes that have many variables.

**Statistical Techniques for the Attainment of Optimum Processing Conditions** — Alfred M. Schneider, American Cyanamid Co., Stamford, Conn. Most manufacturing concerns are interested in obtaining optimum operating efficiency of some industrial process. In most cases this requires much development research in a laboratory or pilot plant before new methods or new materials can be used in full-scale production. Statistically designed experiments can help reduce the cost of research work, aid in interpreting the results and supply a probability basis for the conclusions.

In recent years new techniques in statistical designs which lend themselves particularly well to such applications have been developed. They use the concepts of analytical geometry rather than simple statistics, and multi-factor systems may be

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analyzed and plotted to show the inter-play of those factors determining the measure of efficiency.

The techniques are known as response-surface fitting. The plotting of data results in charts quite different from the familiar straight line or curve types. They often resemble the contour lines on a geographical map. The paper presents the basic concepts of the statistical method.

The gathering of data for this or any other statistical method is similar. Data must be collected according to a definite plan which anticipates the expected use to which the data will be put to provide useful answers.

# MALLEABLE SHOP COURSE

A LARGE audience attended the single malleable shop course session and heard a discussion of the theory of the mechanics of graphitization and the effects of chemistry and melting conditions on over-all cycles.

Panel members were F. W. Jacobs, Texas Foundries Inc., Lufkin, Tex.; J. T. Bryce, Albion Malleable Iron Co., Albion, Mich.; L. R. Jenkins, Wagner Malleable Iron Co., Decatur, Ill.; W. J. Amsbary, Ohio Brass Co., Mansfield, O.; L. E. Emery, Marion Malleable Iron Works, Division Chicago Railway Equipment Co., Marion, Ind.; W. A. Zeunik, National Malleable & Steel Castings Co., Indianapolis, Ind., and C. R. Sorenson, National Malleable & Steel Castings Co., Cicero, Ill.

Mr. Bryce presented a short informal paper covering the theory and mechanics of graphitization of malleable iron, its comparison with nodular iron, effects of hydrogen, oxygen, water vapor, carbon dioxide and carbon monoxide when present in the furnace chamber, and chemical analysis of elements affecting heat treating.

Mr. Jacobs gave a short talk on the factors affecting the annealing of malleable iron and showed what happens to the time cycle for first and second stage annealing; also what other effects result from varying the chemical analysis, deoxidizing the melt, reduction in grain size, increasing casting section size, varying the annealing atmosphere, varying the melting atmosphere and increasing the superheat of the melt.

Discussion revealed 1) that there is no real evidence to support claims that nickel has any effect on rate of anneal, 2) that small and large nodules appear in the grain structure because nodules are constantly growing and this growth is not arrested completely until second stage anneal is finished and 3) that nodule count is taken to be the actual count of nodules on a polished surface of fixed dimension.

# SAFETY and HYGIENE

FOUNDRYMEN interested in safety, health, legislation, hearing and radiation heard four papers on these subjects at two sessions.

**Health and Safety,** official exchange paper, Institute of British Foundrymen, written by Sir George Barnett, Ministry of Labor, England, presented by James W. Lake, industrial hygiene engineer, Michigan Mutual Insurance Co., Detroit. The paper discussed hazards to health common with the foundry industry and suggested means and methods by which conditions could be improved. Slides were shown indicating dust movement patterns and suggested hoods and accessory equipment that can be designed from study of such patterns.

**Legislation Affecting Foundries**—H. J. Weber, director, Safety, Health and Air Pollution Control, AFS. Over 2000 communities now have air pollution laws of some kind and more are in the preparation stages. Some of the laws presently in force were discussed and foundrymen were warned that the impact of restrictive legislation is real. Problems peculiar to particular communities and businesses should be studied carefully and details of proposed legislation worked out to the satisfaction of the lawmakers while still not imposing undue restrictions on normal business activities. Experience has indicated that generally there is an area of compromise that can be agreed upon if foundrymen will participate in pre-legislation planning sessions and make their wishes known.

**Radiation Is Hazardous**—F. A. Van Atta, National Safety Council. Radiation can't be heard, seen or felt, but since an increasing amount of radioactive material is being used for industrial inspection processes, there is need for a real understanding of what the material is, its potential dangers and how to act when an accident occurs. Radiation damage is permanent and persistent and has been known to show no detrimental physical effects until 25 years after exposure.

Radioactive sources when properly shielded and operated under approved control techniques are relatively harmless. Unauthorized persons not specifically trained in handling and use of radioactive materials should be kept away from the source material. Equipment should be operated when people are not around. Source material should be properly shielded in lead or heavy concrete. Exhaust hoods should not be connected with common ventilation systems. Walls of rooms where source is stored and used should be covered with materials that can be removed and destroyed after they have become contaminated by extended exposure.

**Loss of Hearing May Cost You Money**—Dr. P. J. Whitaker, Allis-Chalmers Mfg. Co., Milwaukee. Allis-Chalmers has had a hearing conservation program in effect since 1948, and Dr. Whitaker outlined the procedures used in making audiograms and other tests to provide data to conserve and prevent hearing loss among employees. All employees are examined when hired, and records are established to reduce company liability in case of future claims for hearing loss. Company is liable only for that amount of hearing loss that an employee sustains during employment. If records are not kept, the company is legally responsible for the employee's total hearing loss, all of which could conceivably have occurred before his employment in a new occupation.

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hearing legislation, and damages have been awarded claimants in those states. There is definite need for foundries to take action to prevent hearing loss among employees. Control of noise at the source is the best protection, but protective ear plugs of proper design are an effective measure in areas where a high noise level exists.

# CORE and MOLDING SAND

FOURTEEN papers were presented at five technical sessions and one dinner meeting held by the Sand Division.

**New Techniques for Finding "Come and Go" Causes that Affect Quality**—E. C. Zuppann, Bendix Aviation Corp., St. Joseph, Mich. The traditional method of finding the condition responsible for a change in casting quality was to vary one specific condition while holding all others constant. This now is recognized as a near impossibility. As one condition is changed, other conditions also change. Current statistical control processes recognize that fact and now try to cover the identity of several causes working together to affect casting quality.

This paper describes a method of correlating data on factors affecting casting quality by ranking the value of variances in those factors.

In a written discussion of the paper R. C. Shnay, Canada Iron Foundry Ltd., Toronto, commented that the method might be deceptively simple. A foundryman with limited experience in statistical methods or a statistician limited in foundry experience might apply the data in such a way as to get incorrect results.

**How To Determine Moisture Requirements of Molding Sand**—R. W. Heine, University of Wisconsin, Madison, Wis.; E. H. King and J. S. Schumacher, Hill & Griffith Co., Cincinnati. Presented by Professor Heine. A portion of the water present in a sand-clay-water mixture is adsorbed by the sand grains. Another portion is adsorbed by the clay. The amount of water adsorbed is a function of the AFS sand fineness number and is the same for single or multiple-screen sands. The total area presented by each grain of sand and clay determines the amount of water needed to coat every particle.

Additives, such as wood flour, seacoal, cereal, carbonized cellulose, silica flour and others, present additional water-adsorbing surfaces. Consequently, additional water is required to coat these particles, and the water required to obtain peak strength in molding sand is that amount needed to coat every particle in the mixture.

In practice, however, molding sands usually are run at a moisture level higher than the percentage producing peak green strength. That is done to obtain plasticity or deformation, bulking, dry strength, decreased flowability, easier molding or simply to please molders. Also, the amount of free water affects dry strength, resistance to cuts and washes, dirt, and other results. The conclusion reached is that the free water in a molding sand must be controlled closely because it affects casting results obtained.

In discussion it was pointed out that the calculations presented in the paper may be upset if sand grains are coated with seacoal tars or other contaminants. They would affect the amount of water required to get the desired results.

**Scabbing in Steel Foundry Sands**—Edward E. Hucke, University of Michigan, Ann Arbor, Mich. Work of AFS Sand Division Committee 8-L on sand practice indicates that conventional hot deformation tests and expansion tests cannot be correlated with practical foundry results. However, results of a confined molding test have enabled the committee to predict scabbing tendencies of sand. Predictions were proved in operating foundries, but more work must be done to verify the consistency of such tests.

**Practical Studies of Veining Tendencies**—George DiSylvestro, Burnside Steel Foundry Co., Chicago. Veining results from thermal movement of the sand. It is a bleeding of metal at hot spots in the mold. The veins which appear on the castings can be removed by grinding but they usually occur at hard-to-get-at places, and frequently cracks in the castings appear later where the metal is removed.

In an effort to determine the cause of veining, Burnside designed a casting which is sensitive to small variations in sand, molding practice, pouring temperature, etc. The casting is a square plate section with four short cylindrical projections extending below the plate. The casting is poured from the top. The variations checked include the plastic, core oil and binder additions to the sand; mulling time; pouring temperature; and many more. In each case, it was possible to determine pretty accurately the points under each condition where veining starts.

**Effects of Various Clays and of Tempering Methods on Sand Properties and Casting Quality**—A. E. Murton, Department of Mines and Technical Surveys, Ottawa, Ont., Canada. Nine of ten foundries in Canada do not have mullers, consequently they want to know how to strengthen their molding sands. Clay additives tested in the research were western bentonite, southern bentonite, fireclay and illite. Mixtures were prepared using the four clays, with one batch of each being unmulled and another batch being mulled. Then each test batch was used for ten heats in making the Steel Founders' Society of America test casting.

Castings made by the various molding sand mixtures were measured for scabs and were rated on this basis. Small scabs were those up to 2 in. diameter; medium were 2 to 6 in. diameter, while large were those over 6 in. diameter.

The unmulled mixtures had to be on the wet side, else they would not mold. The sand bonded with western bentonite proved to be the best in both the mulled and unmulled condition, but that bonded with illite was the only one that could be used in the unmulled condition.

**Mold Hardness: What It Means!**—R. W. Heine, University of Wisconsin, Madison, Wis.; E. H. King and J. S. Schumacher, Hill & Griffith Co., Cincinnati. Presented by Professor Heine. Test results indicate that in a clay-saturated sand a close relationship exists between green strength and mold hardness. Sands containing less clay develop lower green strength at a given mold hardness. Changes in sieve analysis, AFS grain fineness number and moisture content have no effect on the relationship.

Mixing, however, is an important factor. Under-mixing lowers the level of green strength at a given mold hardness. Also, additives have been found to change the percentage of clay required to achieve saturation and, therefore, can change the relationship between green strength and mold hardness. Test work conclusions are that mold hardness test values are mainly a reflection of the bonding strength existing in a sand. Discussion brought forth the observa-

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tion that other properties, such as permeability, density, deformation, etc., show no generally applicable correlation to mold hardness.

**Influence of Sand Grain Distribution on Green Sand Casting Finish**—Clyde E. McQuiston, Advance Foundry Co., Dayton, Ohio. Purpose of the research was to advance the understanding of casting surface finish by evaluating variables such as sand grain distribution as expressed by sand grain diameter and squeeze pressure.

Results indicate that the mean sand grain diameter is the most important factor contributing to roughness, that the number of screens over which the sand is spread contributes to roughness, but to a lesser degree than the mean diameter and that the effect of squeeze pressure on roughness is minor in the range of this experiment. In other words, the best casting surface finish will be obtained with a large grain fineness number and a widespread distribution. If a foundry desires to maintain a sand with a given grain fineness number, then the best finish would be obtained with a wide, flat distribution of five or six screens.

In discussions it was pointed out that devices for measuring microinch finish are not standardized. It was suggested that foundrymen use the same type instrument used by customers when trying to meet a specification for casting finish.

**European Self-Curing Oil Binders**—Franz Moser, Oel- & Chemie Werk A.G., Hausen b/Brugg, Switzerland. Air-set core binders as used in western Europe during the last few years were described. These binders essentially are drying oils which are combined with an accelerator and mulled with sand. The mixture is rammed with minimum ramming energy into a corebox, then allowed to stand in the air for a short time to develop green strength before being removed from the box and placed in an oven.

Advantages claimed are that ramming is easy and fast, coremaking economy can be achieved by using the material as a facing with a granular coke backing, a minimum number of core rods and supports are required for large cores, and the resulting core has good dimensional accuracy and a clean, smooth surface finish.

Disadvantages are that coreboxes are tied up for a comparatively long time and the sand mixture has rather short bench life.

In discussion it was pointed out that although cores will harden in air, it is best to bake them at 450°F for 1½ to 2 hr to shorten the coremaking cycle.

**Properties of Molding Sands Under Conditions of Gradient Heating**—N. C. Howells and R. E. Morey, Naval Research Laboratory, Washington, and H. F. Bishop, Exomet Corp., Conneaut, O. Presented by Mr. Howells. A new hot-strength molding and core sand test was developed. It uses a conventional sand dilatometer modified to contain a 1⅛-in.-diam, 2-in.-long cobalt pedestal which can be held at any desired temperature by induction heating. A conventional 1⅛-in.-diam by 2-in.-long sand specimen is placed on the heated pedestal and broken, after the desired time, by raising the dilatometer table hydraulically so that the specimen is forced against a horizontal bar above.

Tests conducted on several different sand formulations show that the compressive strength vs temperature curve obtained by gradient heating differs from that obtained by the conventional isothermal test. Under conditions of gradient heating, the curve is relatively smooth and does not show the sharp peaks and valleys characteristic of the conventional test curve.

An attempt was made to correlate high-temperature sand properties determined by gradient heating with tearing susceptibility. It was found that hot tearing can not be predicted from the hot strength of core sand alone. There is correlation between dry density of the sand and tearing because low density sands can be compressed by contraction stresses of the solidifying casting.

**Influence of Various Bonding Materials on Stress-Strain Characteristics of Bonded Sands**—F. C. Quigley and P. J. Ahearn, Watertown Arsenal, Watertown, Mass., and J. F. Wallace, Case Institute of Technology, Cleveland. Presented by Mr. Quigley. The investigators tested baked, heat-cured and gas-cured sands bonded by sodium silicate, core oil or resin. Tests were conducted on bars of sand supported at the ends with pressure applied at the center. SR4 strain gages were attached to the samples and loads recorded.

Conclusions indicated that all bonds are both elastic and brittle and similar in compression and tension strengths.

In discussion, it was pointed out that separate test samples bonded with sodium silicate were cured with $CO_2$ or baked in an oven. The baking of oil-bonded sands was done at 450°F for 1 hr in a recirculating oven.

**Oil-Bonded Molding Sand**—K. A. Miericke and R. C. Megaw, Baroid Div., National Lead Co., Chicago. Presented by Mr. Megaw. Use of a proprietary, waterless molding sand binder which is a mixture of heavy metal oxides and modified silicate used with naphthenic-base oil was discussed. Sand mixtures are prepared in a standard muller with methyl alcohol used as an accelerator. Molds are made on standard molding equipment.

An advantage claimed for the sand mixture is that it may be used several times without rebonding. The length of time before rebonding is based on Btu input into the mold and the length of time castings are left in the mold before shakeout. If the casting is shaken out before it has cooled below the flash point of the oil, burning will consume some of the oil. Other claimed advantages are that fine sands with low permeability may be used and good casting finish obtained.

Aluminum, brass, bronze, iron, nickel and stainless steel castings have been made in molds bonded with the material.

In a written discussion Robert Dalton, Howard Foundry Co., Chicago, related two years of favorable ex-

Left to right, steel luncheon: John B. Caine; Clyde B. Jenni, chairman; Dale L. Hall, co-chairman; Victor E. Zang, retiring chairman, steel division; A. J. Kiesler, chairman, steel division

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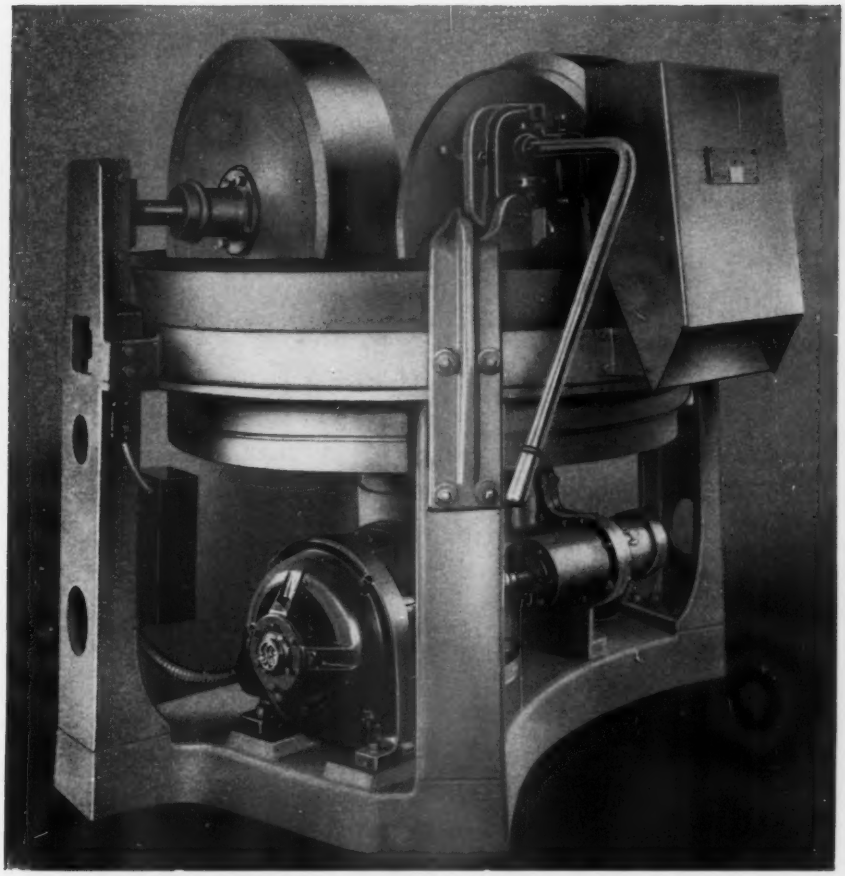

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perience with the material in producing aluminum castings. Castings are sound with a finish of 100-125 microinches. The presence of smoke during shakeout presents a minor problem.

It also was pointed out that no definite test exists for predicting when rebonding is necessary.

**Effect of Temperature on the pH of Foundry Sands**—N. D. Brinkmann, General Motors Corp., Detroit, and Gordon Gottschalk, Thiem Products Inc., Milwaukee. Presented by Mr. Brinkmann. Conclusions from a series of tests on the pH factor in foundry sands indicate that pH varies from lot to lot of sand even though the sand may come from the same pit. pH is affected by heating sands to above 1500°F. A rise in pH to 11 or 12 is associated with a decrease in physical properties of baked cores. When this decrease occurs, reuse of the sand is impossible without some form of reclamation.

A more general conclusion reached was that the variation in test results in this investigation shows the need for close control of all sand variables and that new sand is not constant in its properties.

**Correlation Between Casting Surface and Hot Properties of Molding Sands**—This is the final report of AFS Sand Division Committee 8-J on physical properties of iron foundry molding materials at elevated temperatures. It was presented by J. A. Gitzen, Delta Oil Products Co., Milwaukee, committee chairman. This concluding work deals with developing a single setup laboratory test easy to perform for measuring scabbing, buckling and rat-tailing tendencies of molding sands for iron casting.

Two tests were developed. One is the shock expansion under 1.0-psi load test employing a 1⅛ x 2-in. sand specimen rammed to a green hardness usually found in foundry molds. It is subjected to a constant load of 1.0 psi at 1800°F. Expansion recorded at a recommended time of 22.5 ± ½ seconds. Any tendency toward mold wall expansion failure is indicated.

A second test, the restraining load test at 1800°F after a 5-minute soak, also has practical value.

Conclusions are that the tendency of iron foundry sands to mold wall expansion failures under heat may be reduced by lessening expansion under 1-psi load or lessening restraining load at 1800°F by additions of cushioning materials such as seacoal, pitch, cellulose materials, cereal binders or clays and reducing fines such as silica flour or silt in the mold material.

Dinner meeting of the Sand Division held Tuesday evening was attended by several hundred, and featured a motion picture depicting various phases of **Controlling Quality on the Chevrolet Cylinder Block Casting.**

W. C. Schartow, Chevrolet Saginaw Gray Iron Foundry Division, Saginaw, Mich., was the narrator, and the film showed the numerous steps involved from dredging sand from the lake bottom in Saginaw bay to shipping of the finished casting. The lake sand of 40 to 70 AFS fineness is used to make both cores and molds for the cylinder block production.

# FUNDAMENTAL PAPERS

INCREASING interest in fundamentals relating to metals and alloys and their conversion into castings was demonstrated in two well attended sessions on the subject. The program included seven papers dealing with fluidity, influence of vibration, hot tearing, resins, surface tension and nuclei formation.

At the first session, fluidity of magnesium- and aluminum-base alloys was discussed in two papers—**Fluidity of a Series of Magnesium Alloys** by J. E. Niesse, M. C. Flemings and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass., and **Fluidity of Some Aluminum Alloys** by S. Floreen and D. V. Ragone, University of Michigan, Ann Arbor, Mich.

In both investigations, fluidity was determined by drawing the molten metal from its container through a small tube by vacuum, and measuring the length of flow obtained. In general the fluidity of the alloys varied inversely as the freezing range or the temperature difference between liquidus and solidus. Nonequilibrium freezing range curves were computed for alloy systems for which phase diagrams had been established, and the inverse of those curves followed fluidity results better than the inverse of the equilibrium freezing range curves.

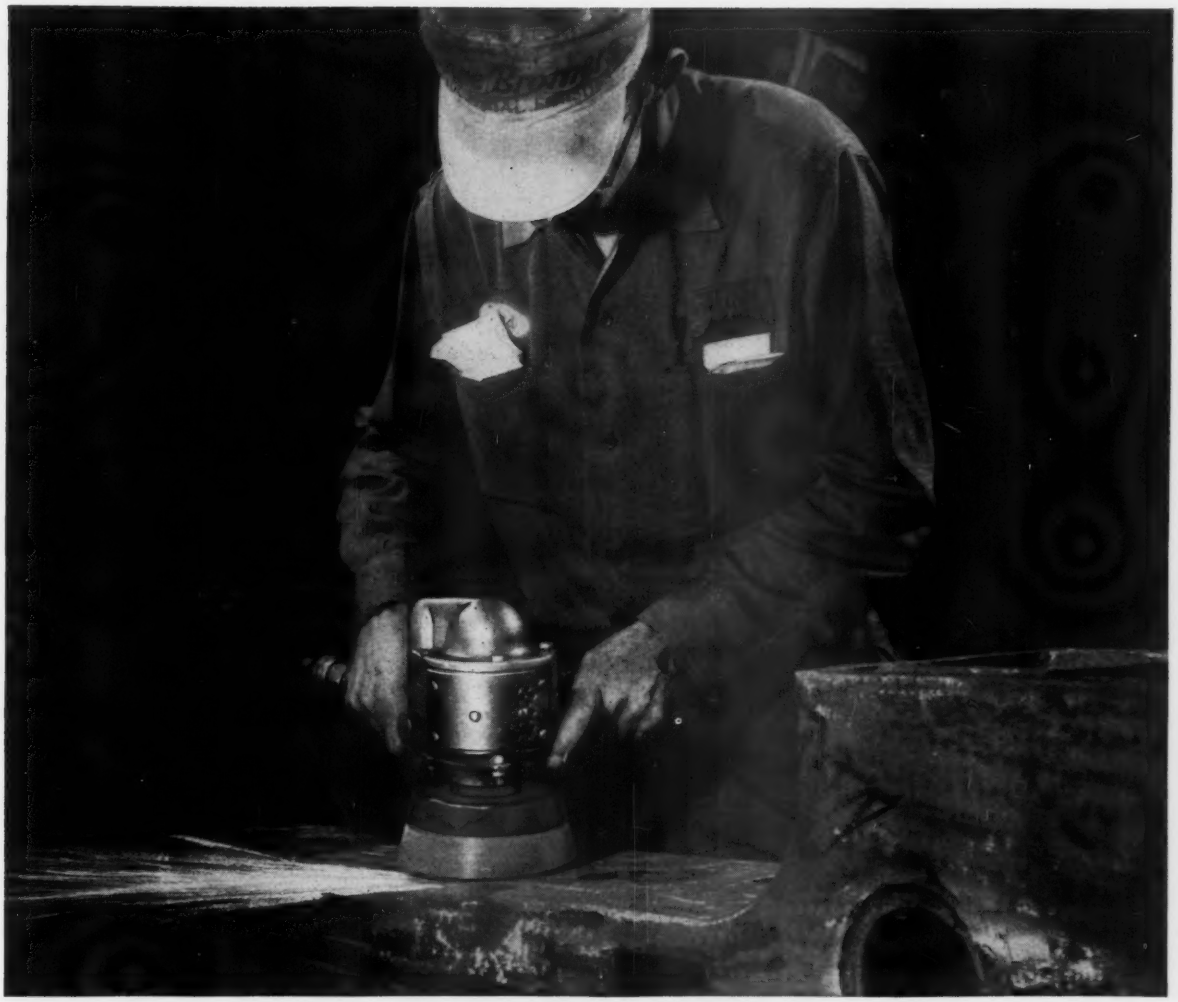
**Influence of Vibration on Solidifying Metals** — A. H. Freedman and J. F. Wallace, Case Institute of Technology, Cleveland, described application of two rates of vibration on brass containing about 64 per cent copper, two aluminum-base alloys and a manganese bronze. One rate of vibration was 60 cycles per second, the other 20 kilocycles per second. The lower rate of vibration was applied by mounting the crucible containing the molten metal on a vibrating plate and the high rate was applied through a probe from a magnetostrictive unit immersed in the molten metal.

On the brass and aluminum both rates of vibration broke up the usual dendrites obtained during conventional solidification to form fine grain structures. Much finer grain was obtained with the higher or 20 kilocycle rate of vibration. With manganese bronze, however, little effect was noted from either high or low rates of vibration. It is believed that this circumstance is due to the fact that the manganese bronze composition provides sufficient nuclei for formation of a fine grain structure. Physical properties of the alloys were improved by vibration.

**Investigation of Metallurgical and Mechanical Effects in Development of Hot Tearing**—H. F. Bishop, C. C. Ackerlind and W. S. Pellini, Naval Research Laboratory, Washington. All alloys pass through a critical hot tearing temperature or film stage during solidification where no ductility or strength exists. Immediately below the solidus temperature high ductility and strength are developed. Time-rate of extension of the metal during the film stage condition is the primary mechanical factor which determines hot tearing.

Metals which show high contraction rates at sub-solidus temperature generally are characterized by severe hot tearing tendencies. Presence of low-melting segregates which extend film life permit more strain to be imposed on the films. Coarse grain size results in a high concentration of strain per grain boundary which leads to hot tearing while fine grain size has the opposite effect.

Second session opened with the paper, **Adhesion of Phenol-formaldehyde to Various Refractory Oxides** —J. K. Sprinkle and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass. Work of adhesion or the theoretical work required to separate phenol-formaldehyde from various refractory oxides



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was determined from surface tension and contact angle data, and the methods were described. Surface tension of the resin was found to be 29 dynes per centimeter at 300°F in dry helium, and the contact angles of the resin with the various oxide refractories under the same conditions decreased from 130 in the case of magnesia to 92 for zircon.

Other oxides and their angles were alumina 125, zirconia 112, and silica 100. Work of adhesion increases with decreasing angle of contact and for zirconia was 18, for silica 24 and for zircon 28. Tensile test specimens of the several refractory oxides with the resin showed the same order of arrangement as for work of adhesion, namely, 345 psi for zirconia, 460 psi for silica and 720 psi for zircon.

**Effects of Gaseous and Solid Addition Elements on Surface Tension and Contact Angles (on Graphite) of Various Iron-carbon Alloys** — J. Keverian, General Electric Co., Schenectady, N.Y., and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass. Experimental procedure in ascertaining the effect of oxygen and sulphur on iron-carbon alloys and also of cerium additions was described. Addition of oxygen lowers the surface tension and contact angle as well as the melt-gas surface tension and the graphite-melt interfacial energy. Sulphur addition lowers the melt-gas surface tension appreciably and indications are that it may lower the graphite-melt interfacial energy.

Both oxygen and sulphur additions to a pure iron-carbon alloy favor the formation of flake graphite structures similar to those found in commercial gray irons. Addition of cerium to a sulphur and oxygen containing iron-carbon alloy causes an increase in liquid-gas surface tension by decreasing the activity of those surface active elements, and an increase in the graphite-melt interfacial energy.

Previous work indicated that graphite spherulites can be obtained without aid of inoculants in vacuum-melted high-purity iron-carbon and nickel carbon-alloys under conditions of high graphite-melt interfacial energy. It, therefore, appears that cerium, by decreasing activity of oxygen and sulphur and resultant increase in the graphite-melt interfacial energy, promotes formation of graphite spherulites.

Meeting closed with a paper **Effect of Ferrosilicon and Magnesium Inoculation on Formation of Nuclei in Cast Iron**—Frederik Hurum, Oslo, Norway, which was presented by

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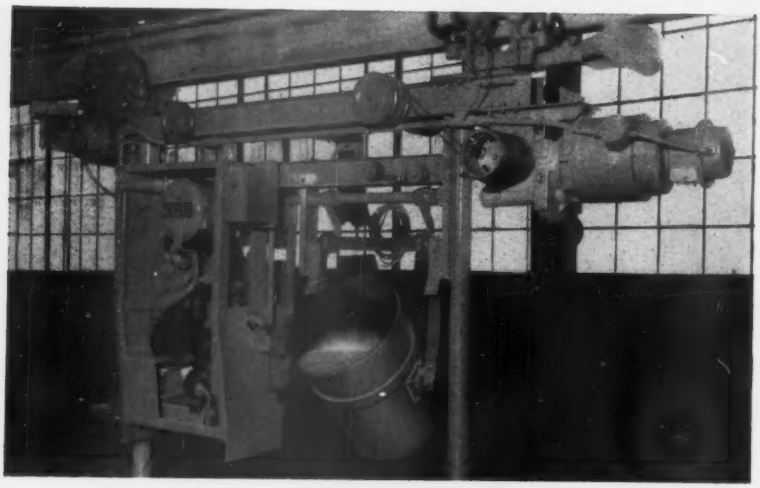

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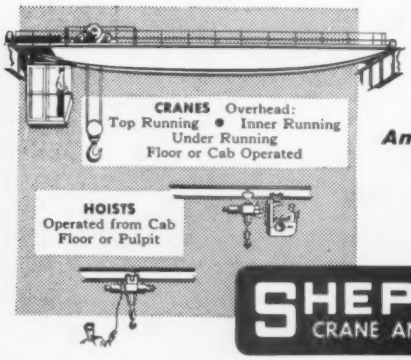


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*Editor's Note: Reports on other technical sessions of the AFS Congress will be presented in the July issue.*

## Conference Covers Application Of Science and Technology

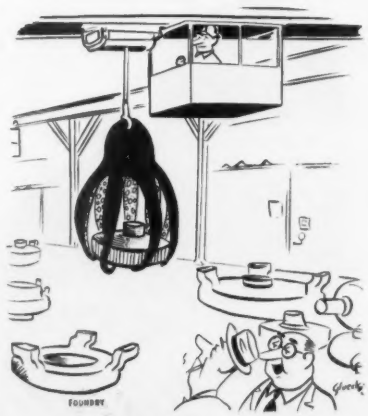
At a conference of the Council of Ironfoundry Associations in London, England, on Nov. 7, 1956, problems of bringing a greater application of science and technology to the foundry industry were discussed. The report of the conference is contained in a booklet, "Men, Management and Metal," which is available without charge from the Council at 14 Pall Mall, London, S.W. 1, England.

Many vital factors related to the supply and training of technicians and managers are covered. The changing technical and educational requirements are touched on with emphasis on the necessity for foundries to plan now on the course of action they will pursue to obtain able and well-trained men.

## Book Review

*Foundry Ventilation and Dust Control,* cloth, 257 pages 7 x 9½ in., published by British Cast Iron Research Association, Bordesley Hall, Alvechurch, Birmingham, England. Price $10.

Book contains 17 papers presented at a conference on foundry ventilation and dust control at Harrogate, England, April 27-29, 1955. Health and safety, foundry lighting, general ventilation, the carbon monoxide hazard, exhaust systems and good housekeeping are subjects discussed in addition to all the aspects of dust control and suppression.



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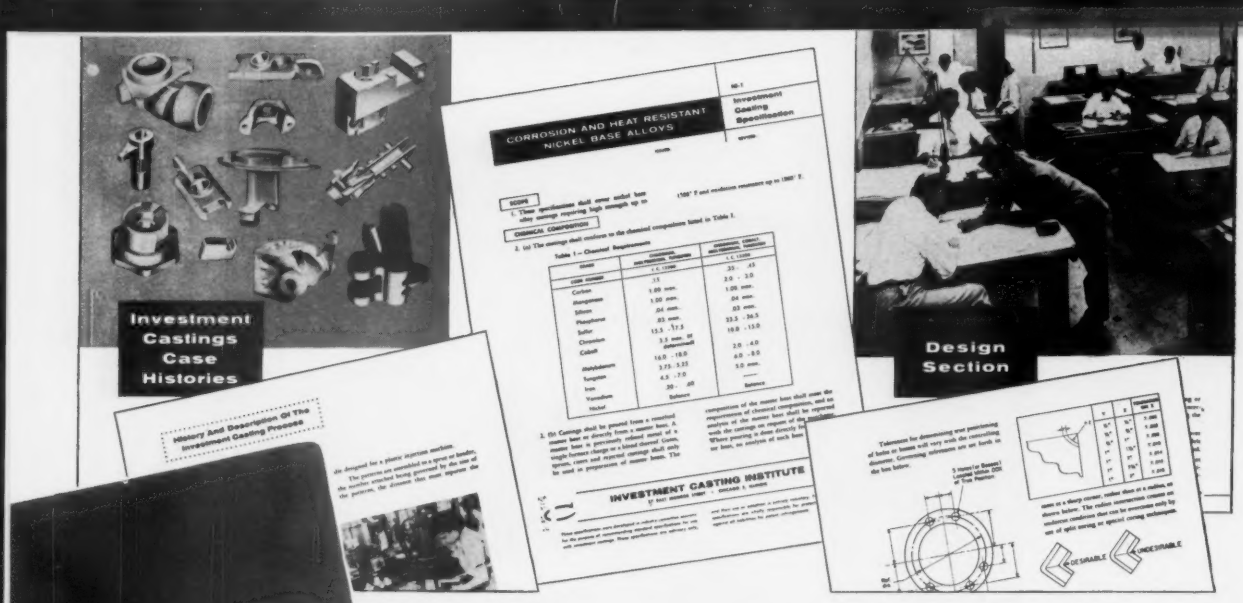
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ICI's recently completed "Engineering and Design Manual" details unique characteristics of the investment casting process and serves as a guide for their application by design engineers, casting buyers and foundrymen

# Investment Casting Institute

## *Releases Manual at Spring Meeting*

By ROBERT H. HERRMANN
*Associate Editor*

THE Investment Casting Institute held its annual spring meeting Apr. 30-May 2 at the Sheraton Park Hotel, Washington. Committees met on the first day; the technical session was held on the second, and the third day was devoted to a discussion of business topics.

One of the highlights of the business session was presentation of the society's "Investment Casting Engineering and Design Manual" to members. Representing nearly 2½ yr of effort by society member companies under direction of a committee headed by Robert R. Miller of Precision Metalsmiths Inc., Cleveland, the manual is intended as a practical working reference for the design engineer, metallurgist and purchasing man. It presents in specific detail characteristics of the investment casting process and serves as a guide for applying them to a user's products. Copies are available for $5 from the institute at 27 East Monroe St., Chicago 3.

First of the technical papers, **Comment on High-Temperature Alloys,** was by Nicholas J. Grant, Massachusetts Institute of Technology, Cambridge, Mass. Advancement in aircraft jet engine performance is creating a need for engine parts made of materials which will withstand temperatures above 1500° F. Vanes must operate at 2100° F and turbine blades at 1800° F.

Temperature, corrosion-resistance and strength properties of nickel, cobalt, columbium, (niobium), molybdenum and tungsten alloys were discussed. Corrosion-resistant coatings for metals and the use of cermets and hard particle metallic oxides for vanes and blades also were covered.

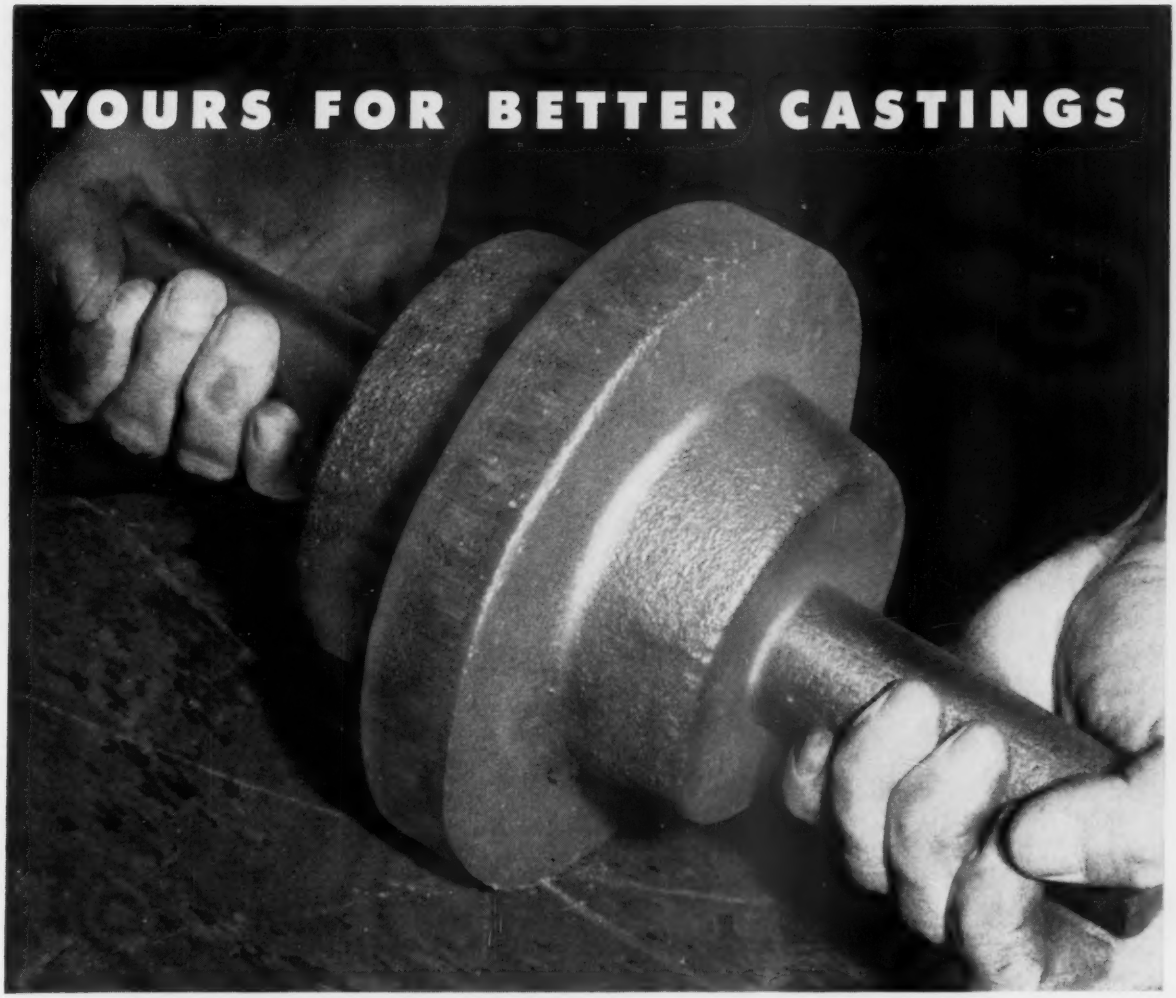
The casting of many of these materials is difficult—impossible for some. However, if vane and blade work goes out of the foundry field, demand still will remain for other high-temperature engine parts which can be cast or must be cast because of part design and nature of the material used.

**Physical Properties of Cast Aircraft Steels**—Robert J. Ely, American Brake Shoe Co., Mahwah, N. J. Although casting is the best method for producing steel aircraft parts, customers often shy away from using cast parts because they once had one that failed, because of difficulties in establishing acceptance standards, and because sound design engineering data for steels of over 180,000 psi tensile strength is lacking. In general, the lack of good reproducibility of cast parts is cited by many customers as the biggest deterrent to their use of castings.

Tests of various aircraft steels were described with the comment that test bars show alloy characteristics only. Usually those properties are less than the potential of the alloy. Never are they greater.

**Design and Use of Investment Castings in Airframes**—S. K. Hodgson, Chance Vought Aircraft Inc., Dallas, Tex. Chance Vought uses parts produced by several casting processes. Investment castings account for about 40 per cent, most being in steel with some in aluminum and manganese bronze. Company policy in the future will be to buy machined cast parts from foundries. The method will help foundrymen discover casting difficulties early, and corrective procedures can be undertaken immediately. Fewer part rejections will result.

The company has reduced its air-

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MELTING POTS
INGOT MOLDS

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*for* FOUNDRYMEN

You'll find it pays to standardize on Acme melting pots and ingot molds. They reduce down time and replacement costs because they're cast from a special iron formula that combines strength with high temperature resistance. They improve quality and reduce rejects, too, because they're designed for even heat distribution without hot spots. If you melt any non-ferrous metals, take advantage of our more than 30 years' experience in this field. It's your assurance of consistent high quality in Acme melting pots and ingot molds . . . designed *by* foundrymen, *for* foundrymen.

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craft costs in recent years by using steel castings wherever possible. A successful cast parts program requires continuous liaison between customer and foundryman. Several Chance Vought aircraft castings were shown and described.

**Department of Defense Program on Casting Technology**—John H. Garrett, Office of Assistant Secretary of Defense, Washington. Generally, the department depends on private industry to develop materials and fabrication methods needed for weapons. But suppliers are not always familiar with new and costly materials. Private research and production programs on a new material are slow because cost is a limiting factor, and large expenditures may not be justified by the prospective market for the product. Military needs, however, are dictated by a desire for survival of the nation. Consequently, the government spends large sums of money on such projects as the development of titanium, intercontinental missiles, nuclear exposives and nuclear propulsion of ships and aircraft.

### Panel Studies Use of Castings

Foundrymen, like other manufacturers, hesitate to become involved in research and tooling programs for the unstable military market. But parts for some of the new military projects require materials and designs which are difficult and expensive to make as forgings or machinings. As a result, interest is developing for castings as a solution to the problem. With thought that previously encountered castings' deficiencies might not be fundamental to the process but due to inadequacies in foundry technique, the Department of Defense through the Materials Advisory Board of the National Research Council organized a panel to study the possibility of castings' use. The panel reported that the following four developments are necessary to overcome obstacles to wider acceptance of steel castings as reliable aircraft components:

1. Foundries must prove that steel castings meeting needed strength-weight requirements and of consistent high quality can be made in production quantities.
2. Government and aircraft manufacturers must establish comprehensive and realistic quality standards and applicable specifications for steel castings.
3. Acceptable testing procedures must be developed.
4. Designers and foundrymen must recognize each other's problems and cooperate to develop satisfactorily designed cast parts.

**Report of the ICI Metals Division**—

# they all like ALLIS-CHALMERS fork lift trucks

## OPERATOR:

"Must have been engineered for the driver," says the operator of an Allis-Chalmers fork truck at a midwest foundry. "Shifting is handy and I like where the controls are located. Have plenty of room for driving."

## here's why they like them

Important controls are right where an operator would like to have them. Gauges are in plain sight, easy to read. Floor is clear, operator steps on or off either side.

## SERVICEMAN:

"Finest truck from a mechanic's point of view," is the comment of the lift truck fleet serviceman at a midwestern plant. "In over 3,000 hours of operation, the Allis-Chalmers truck has caused no trouble at all."

It takes only 22 seconds to strip an Allis-Chalmers fork truck for servicing—only 22 minutes for two men to disassemble right down to the bare frame.

## PRESIDENT:

"Would like you to know how well satisfied we are," writes the president of an eastern warehousing company. Operating up and down a steep ramp had caused exceptionally heavy clutch repair costs with older trucks, but "we have yet to experience our first clutch trouble with an Allis-Chalmers truck."

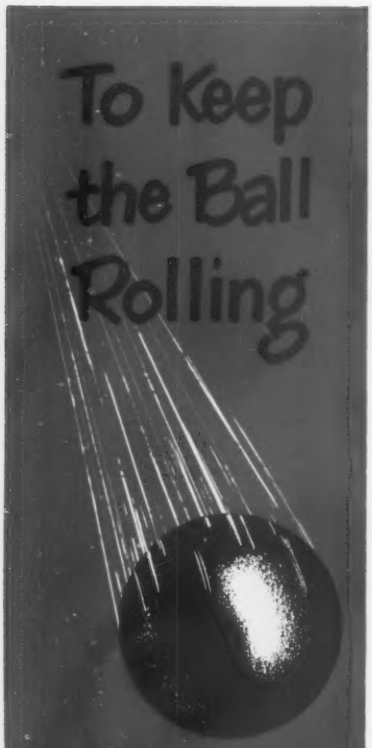
Allis-Chalmers fork lift trucks were the first with optional torque converter drive — which eliminates clutch problems, saves shifting, provides torque to handle steep grades with ease.

BH-37

*Join the growing list of satisfied Allis-Chalmers fork truck users. You'll find it profitable in every way. See your dealer or write direct for more information on trucks to fit your needs.*

MATERIAL HANDLING DEPT., BUDA DIVISION, MILWAUKEE 1, WISCONSIN

**ALLIS-CHALMERS**

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Roger F. Waindle, Wai Met Alloys Co., Detroit. The work of division committees studying metals, heat treatment and vacuum melting was described briefly. Comment also was made on a current industry-wide testing progrem based on the thesis that foundries should be able to gate test bars in such a manner that they will show the true potential of the metal being poured.

**Some New Techniques for Nonferrous Precision Casting**—Samuel Lipson, Frankford Arsenal, Philadelphia. Purpose of the paper was to show requirements for making wave-guide castings and to stimulate interest of foundries in making them. During investigational work satisfactory 40E aluminum alloy and silicon brass castings were made in investment molds. Surface finishes and dimensional tolerances required for good reproducible electrical functioning were obtained.

**Report of the Process Materials Standards Committee** — Walter A. Dubovick, Engineered Precision Casting Co., Matawan, N. J. Work of the subcommittee on pattern materials is completed and will be published. Work also is completed on the raw materials project. Poor response, however, was obtained in gathering information on proprietary materials. Questionnaires will be resubmitted.

**Engineering Properties of Pattern Waxes**—Charles J. Marsel, New York University, New York. Experiments were conducted with six proprietary pattern waxes to determine their viscosity, hardness, volume change and tensile strength as a function of temperature. Results indicate that much remains to be done by way of correlating wax properties with those required for proper investment casting practice.

Luncheon speaker at the technical session was Harrison Wood, foreign correspondent, columnist and broadcast commentator, who spoke on **This Changing World.** He said that communism will not bring on war but poor government will, regardless of the country. In the United States excessive centralized government, bureaucracy and many domestic governmental policies are stifling individual initiative. That could lead to bankruptcy. Solution to the problem lies in reduced taxes, a balanced budget, spiritual and political morality, elimination of bureaucracy and decentralization of government.

H. B. McCoy, administrator of the Business and Defense Service Administration, United States Department of Commerce, spoke at the business session luncheon on **What the Business and Defense Services Administration Does for Your Business.**


# PYRO LANCE

**get below surface readings for greater accuracy**

Temperature readings of molten nonferrous metals are only accurate when taken below the surface, unaffected by dross and other surface conditions. That is why there is industry-wide acceptance of the Alnor Pyro Lance.

Portable, handy to use, the Alnor Pyro Lance has a protected thermocouple mounted in the lance tip. Enclosed couple is protected against flame, fumes and corrosion, assuring long, accurate service under severe conditions.

Pyro Lance models are available for a wide variety of metals and foundry operations. Write today for Bulletin 1724-D and see how you can have low-cost quality control in your foundry. Illinois Testing Laboratories, Inc., Room 511, 420 North LaSalle St., Chicago 10, Illinois.

Alnor

**PRECISION INSTRUMENTS FOR EVERY INDUSTRY**


Circle 687 on Inquiry Card—Page 51

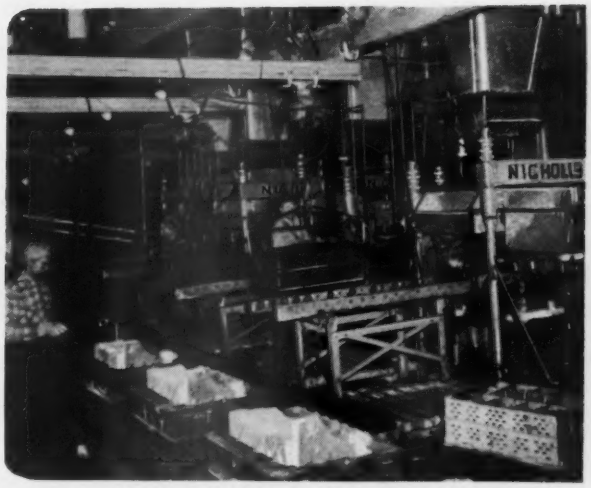


Circle 688 on Inquiry Card—Page 51

# Whatever *your* requirements there's a

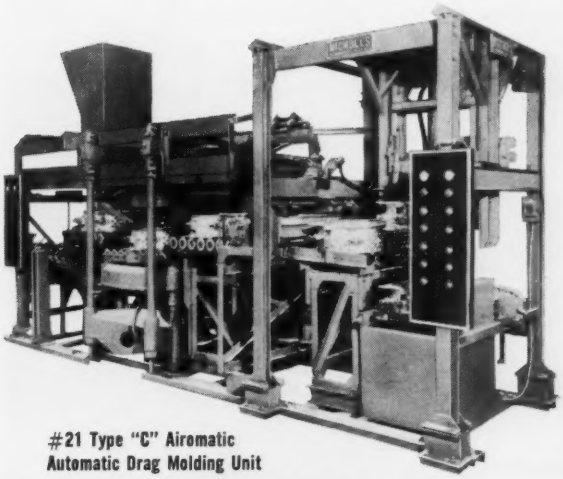
# NICHOLLS

# MOLDING MACHINE to fit the job!




A battery of Nicholls "push-button" molding machines in a large foundry.

**LARGE OR SMALL . . .**
**MANUAL OR**
**AUTOMATIC**



**#21 Type "C" Airomatic**
**Automatic Drag Molding Unit**

Heavy Duty Jolt & Power Squeezer Drag Molding Machine with Pneumatic Pattern Draw. Equipped with air operated car type squeeze head and built-in flask roll-in and mold roll-out device with measuring sand hopper, flask indexing device and sand spill upset, flask feed-in elevator, mold turn-over and mold transfer.

**Want ECONOMY?**

Minimum working parts, dirtproof housings, forced lubrication **lower maintenance costs.**

**Want EFFICIENCY?**

Simple operation, safety devices that eliminate dangerous risks and costly mistakes, precision engineering **save materials . . . increase production.**

**Want AUTOMATION?**

Push-button operation, automatic air-to-air control save manhours . . . **guarantee uniform high-quality molds.**

You can always depend on Nicholls for consistently better molds . . . for a continuous flow of molds . . . for major savings in time and costs which years of experience and scientific know-how make possible. Write, wire, phone TODAY for bulletins, specifications and prices . . . better still, tell us your problems.

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# NICHOLLS

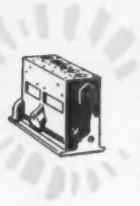
**• FOR HALF A CENTURY THE BEST IN MOLDING EQUIPMENT**

NARCOLINE NARCOLINE

**Slag-Resistant Plastic Refractory**

NARCOLINE

**NARCOLINE**
**Assures Cleaner Castings**



It successfully resists the erosive and corrosive action of metals and slags, eliminating refractory inclusions from the casting.

**NARCOLINE**
**Facilitates Metal Flow**

It resists graphite burnout under operating conditions, and maintains a lasting lubricated surface for easy metal flow.

**NARCOLINE**
**Assures Easy Slag Removal**

It resists the wetting action of molten metal and slag, permitting ladles to be cleaned of solidified metal and slag with little effort.

**NARCOLINE**
**Easy to Install**

It can be rammed to any desired shape with mallet or air hammer. Requires no special training to install.

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191 Victoria Ave., South, Hamilton Ontario

*Circle 690 on Inquiry Card—Page 51*

## Vesuvius Crucible Sets Up Scholarships in Ceramics

Two undergraduate scholarships in ceramic engineering have been established at Pennsylvania State University by Vesuvius Crucible Co., Swissvale, Pa., to begin with the fall semester of the 1957-58 school year.

Designed to encourage men of ability to enter the field of ceramics, the scholarships will be granted to freshmen entering the university's College of Mineral Industries. Each scholarship provides $500 annually and will be renewed for each of the three succeeding years if academic standards are maintained. Information relating to applications for these scholarships may be obtained from the Mineral Industries Scholarship Chairman, Mineral Industries Building, University Park, Pa.

Vesuvius manufactures graphitic refractories, including stopper heads for steel pouring and crucibles for nonferrous melting.

## Film Provides Information on Grinding Wheel Selection

A 16-mm sound-color motion picture, "How to Select the Right Grinding Wheel," explains the meanings of typical grinding wheel markings and shows the variations of each unit symbol. Actual recommendations for two different grinding jobs are developed step-by-step so that the viewer has a clear understanding of the reasons for the wheels suggested.

The film is available for showing by writing to Norton Co., Worcester 6, Mass., or by contacting any Norton district office.

"He claims he can lift a guy's wallet without his knowing it."

# When Accuracy Counts...

**Depend on Three Way Alloy Control**

- *Quantometric*
- *Spectrographic*
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A complete, accurate and quick analyses service at surprisingly low cost covering:
Aluminum—Brass—Bronze—
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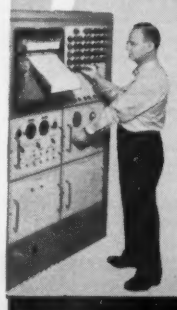
Our facilities are geared to handle routine daily control and occasional miscellaneous samples. Mailing envelopes furnished gratis for convenient sample transmittal.

***Let us be another department of your company.***



*Teletype PG-544, Phone FRemont 1-2345 or Write today for complete information.*

**SPECTROCHEMICAL LABORATORIES, INC.**
P. O. Box 8781, Pittsburgh 21, Pa.

*Circle 691 on Inquiry Card—Page 51*

# NO CURL...

## The Biggest News in

# Safety Leggings and Spats

## ...thanks to American Optical Engineering!

**ADVANTAGES**

1. **Positive Protection against Molten Metal Splash**
2. **Snug Conformity of the Flare with the Shoe**
3. **Longer Life — Up to 400% Approximately**

You're looking at a revolutionary development in Protective Leggings and Spats — American Optical's new "no-curl" flare. It's made of a specially developed compound which always "behaves" — *lies flat on the shoe.* We've tested it against all molten metals from lead to steel. One steel mill, for example, reported no curling — *no sign of curling* in eight to ten weeks of constant use!

Yes, and this flare lasts as long as the basic legging or spat — will give you and your men up to 400% more active use than leggings and spats made with conventional flares.

So, once again American Optical comes up with a quality "first" that gives you more for your money — proving it *pays* to insist on Ⓐ trademarked safety products. Your nearest American Optical Safety Products Representative can supply you.

**S-1512CL SPRING TYPE LEGGING**

Flare is 5½" down crown. Chrome tanned cowhide uppers riveted to spring steel frame. No adjustment necessary. Easily put on and removed. Fits securely at ankle and below knee. Protects lower leg, ankle, instep.

S-1481A Same as S-1512 but with uppers of asbestos.

Both S-1512CL and S-1481A have spring clip on instep which holds flare in position.

**S-7X 211 SPAT**

Flare is 7½" long down the crown — long enough to be trimmed to the smaller foot. 2 leather bag straps on leg have slide fasteners for quick adjustment. Snap fasteners for quick release. Chrome tanned cowhide uppers with wide elastic webbing also equipped with 2 snap fasteners for speedy release. Understrap is same type of material as flare and is replaceable.

*Always insist on the Ⓐ Trademark on Lenses and Frames*

American Ⓐ Optical
COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

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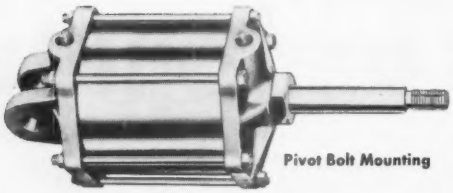
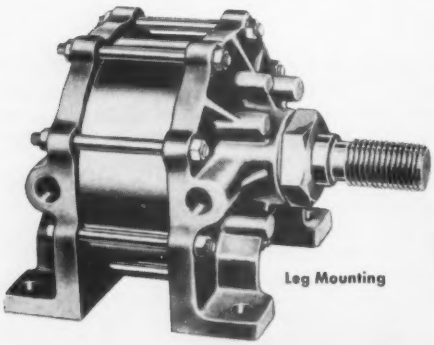
## your one source for AIR CYLINDERS

**push, pull, single or double-acting, with or without cushion . . . for every type and mounting**

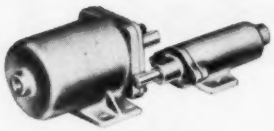


Pivot Bolt Mounting

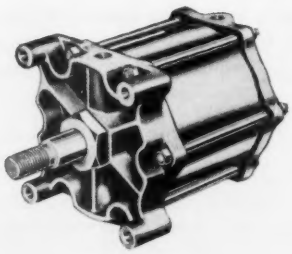


Leg Mounting

Base Mounting

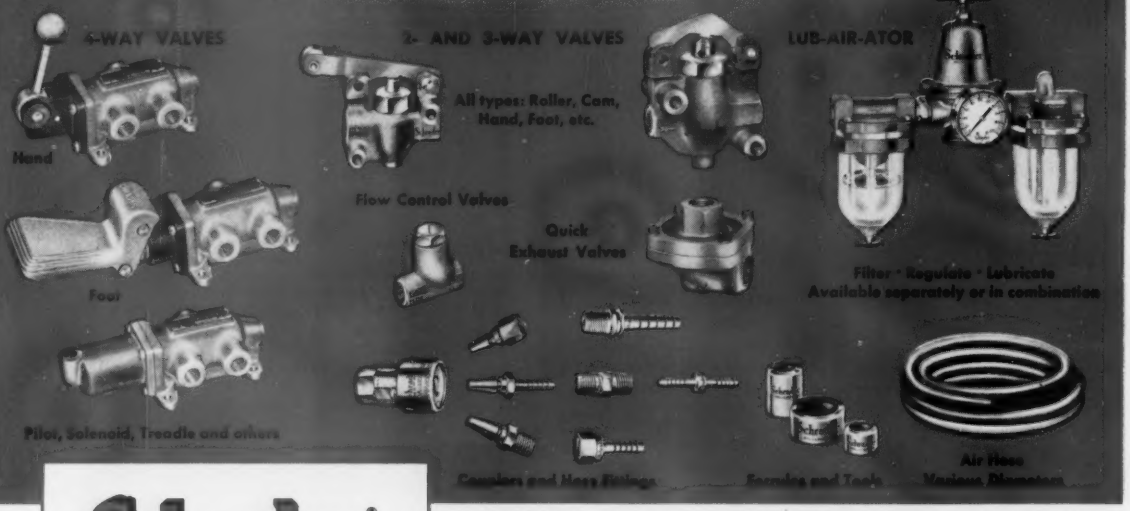


Small Clamping Cylinders



Flush Mounting

## VALVES and everything you need in AIR ACCESSORIES

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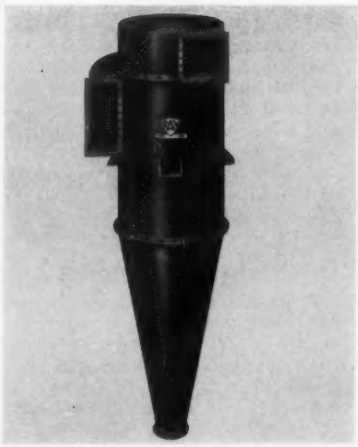
QUALITY AIR CONTROL PRODUCTS

# FOUNDRY EQUIPMENT AND SUPPLIES DIGEST

For More Details on These Items Use Reply Card —Page 224



## DUST SEPARATORS

Centrifugal dust separators are available in 20 standard sizes handling air volumes from 150 cfm upwards. Made of welded, heavy-gage, black iron the separators are designed so that the path of the dust-laden air traveling through the unit encounters a minimum of turbulence due to the scroll inlet and airfoil inlet vane. A steep, smooth cone assures uniform and quick delivery of dust to the outlet. Fibrous, granular, abrasive, fine or coarse dusts at normal or high pressures can be handled. Made by **Day Sales Co.**, 810 Third Ave. N.E., Minneapolis 13, Minn.

For More Details Circle No. 401—Page 224

## CONVECTION OVENS

Turbo-convection ovens are designed for normalizing and drawing ferrous and nonferrous metals, mold drying, tempering, welding rod storage, paint baking or other similar applications. Various voltages in alternating or direct current and various phases are available as well as extra power for heavy loads and fast heat-up. Stands, extra heavy shelves, a variety of temperature controllers and timers and an exhaust adaptor can be supplied. Six standard models ranging from 225 to 1000°F and heating chamber size from 4.75 to 27 cu ft are produced. Made by **L & L Mfg. Co.**, 136 Eighth St., Upland, Delaware Co., Pa.

For More Details Circle No. 402—Page 224

## PLASTER RELEASE

White powder plaster release compound reportedly provides patternmakers with a material they can add to the plaster release lubricant they normally use to give improved cast reproductions with the easier release of the cast from wood or metal pattern or corebox. It releases plastic as well. The compound has a fine texture and does not break down in extreme heat. Made by **Lubikold Co.**, 516 Bergen St., Brooklyn 17, N. Y.

For More Details Circle No. 403—Page 224

## DRY ICE CONVERTERS

Dry ice converters are pressure vessels with removable quick-opening closures into which dry ice is charged and which stores the resulting liquid and gaseous carbon dioxide indefinitely under pressure. Standard fittings offered are $CO_2$ outlet valve, pressure gage, drain valve, safety head and high pressure tubing and fittings for connecting converters together. Converters are said to provide an inexpensive source for $CO_2$. No power or refrigeration is required. Capacities from 150 to 1000 lb are available. Made by **Dry Ice Converter Corp.**, Dept. C, Box 1652, Tulsa, Okla.

For More Details Circle No. 404—Page 224

## SELF-DUMPING HOPPER

Self-dumping hopper is 30 in. wide and is engineered for handling bulk materials, scrap and waste through narrow aisles and in confined areas.

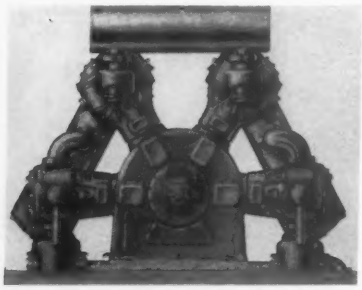
Hopper capacity is 10 cu ft. Mounted on three casters, the hopper can be pushed manually or transported by fork truck. Malleable iron and rubber tire casters are available. Self-dumping action is triggered when the operator releases a locking handle on the rear of the hopper. It rolls forward to dump its contents, then returns to an upright position and automatically locks itself in place. Height is 40 in., and length is 49 in. The 30-in. width is standard but the hopper can be made narrower. Made by **Roura Iron Works Inc.**, 1401 Woodland Ave., Detroit 11, Mich.

For More Details Circle No. 405—Page 224

## AIR COMPRESSOR

Heavy-duty, industrial air compressor in the 350 to 1000-hp range has an output at 80-125 psig rated

from 2418 to 6408 cfm, depending upon motor horsepower. The compressor is a four-cylinder, double-acting, water-cooled machine of semi-radial design, achieving final pressure in two stages. Three standard single models and three twin unit models are available. Twin units con-

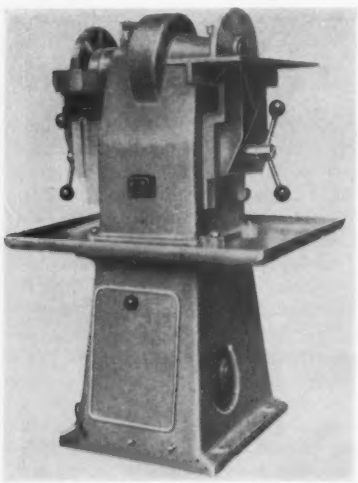


sist of two standard compressors powered by one motor. Drive may be by electric motor, either flange-mounted or coupled, or by diesel engine, steam turbine or turbo-electric combinations. Made by **Joy Mfg. Co.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

For More Details Circle No. 406—Page 224

## DISC FILING MACHINE

Disc filing machine for removal of ferrous and nonferrous metal, wood and plastic may be equipped with two discs at one time ranging in size from 3⅛ to 12 in. Work table provides for mounting fixtures or special sliding tables for special operations. The unit is powered by a 1-hp motor which turns discs at 175, 250, 310, 370 and 410 rpm. Additional



speeds may be achieved by changing pulleys. Over-all dimensions are 28 in. wide x 32 in. high. Weight is 510 lb. Made by **Jersey Mfg. Co.**, 466 Livingston St., Elizabeth, N. J.

For More Details Circle No. 407—Page 224

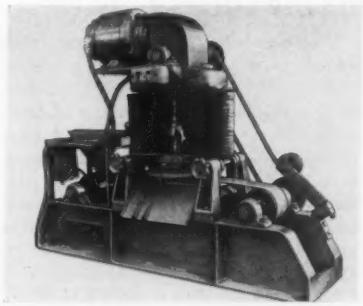
## HOLDING CRUCIBLE

Double compartmented silicon carbide holding crucible provides a "resting" chamber for molten aluminum after melting and permits metal to be maintained at a constant temperature. Manufacturer reports this single crucible performs the work formerly done by two crucibles and takes considerably less space. Most bowl type crucibles are adaptable to the separator device. Made by **Electro Refractories & Abrasives Corp.**, 344 Delaware Ave., Buffalo 2, N. Y.

For More Details Circle No. 408—Page 224

## MAGNETIC SEPARATOR

Magnetic separator provides a positive method of determining the feasibility of magnetic concentration of minerals. The unit operates by passing a material through the high intensity magnetic field produced by the rotating magnetic ring. The magnetics contained in the feed material are lifted from the mixture as it



passes beneath the take-off ring. While this ring type "D" separator is most often used in laboratory fractionation, it has been used successfully in metallurgical control procedures and for commercial separation in small plants. Made by **Stearns Magnetic Products, Division of Indiana Steel Products Co.**, 635 South 28th St., Milwaukee, Wis.

For More Details Circle No. 409—Page 224

## pH METER

Line-operated pH meter has an accuracy of 0.1 pH unit and can be furnished either with individual glass and calomel electrodes or with a probe electrode that is a combination of glass and calomel electrodes. Meter has a 2½-in. scale length with 70 division lines reading from pH 0 through 14, continuous through neutral point without switching. It is stabilized for wide range of line voltage fluctuations, unaffected by line-frequency variations. Made by **Photovolt Corp.**, 95 Madison Ave., New York 16, N. Y.

For More Details Circle No. 410—Page 224

# LITERATURE

## Shell Mold Sand Muller

Installation and operating instructions, sizes, specifications and care and maintenance data for sand mullers for automatic cold coating of sand with phenolic resin for shell molding or blending of silica sand with bentonite are provided in brochure.—**Shallway Muller Corp.**, Cambridge, N. Y.

For More Details Circle No. 411—Page 224

## Shot and Grit

Illustrated catalog covers SAE specifications on all types of abrasive shot and grit and lists important characteristics, considerations and uses for the 20th Century Line manufactured by the company. Methods and advantages of shot peening and impact cleaning and proper abrasive mixtures are covered. — **Cleveland Metal Abrasive Co.**, 887 East 67th St., Cleveland 8, O.

For More Details Circle No. 412—Page 224

## Spectrochemical Analysis

Brochure CH401 outlines the methods, instruments and accessories encountered in all phases of spectrochemical analysis and includes typical problems, suggested laboratory floor plans and information on special purpose instruments.—**Jarrell-Ash Co.**, 26 Farwell St., Newtonville 60, Mass.

For More Details Circle No. 413—Page 224

## Drum Agitator

Technical features of drum agitator, procedure for mounting in the threaded bung of a 55-gal drum and a discussion of the necessity of drum agitation for liquid chemical mixtures are offered in data sheet 2.—**Prenco Products Inc.**, 507 East Ten Mile Rd., Hazel Park, Mich.

For More Details Circle No. 414—Page 224

## Air Control Valves

Form 1050 illustrates and describes line of 2-, 3- and 4-way poppet-type air control valves that will handle pressures to 150 psig and temperatures to 250°F.—**Galland-Henning-Nopak Division**, Milwaukee 46, Wis.

For More Details Circle No. 415—Page 224

## Parting Agents

Instructional leaflet, Code 5-116, outlines procedures for using silicone parting agents in shell molding. Effective methods of breaking-in and cleaning patterns are presented. — **Dow Corning Corp.**, Midland, Mich.

For More Details Circle No. 416—Page 224

## Management Studies

Brochure details problem areas in which it can provide technical-economic aid to management. Studies are carried on in general, research, production, marketing and informa-

# For Foundrymen

tion management areas, product development, operations research and systems analysis, industrial economics and area development.—**Battelle Memorial Institute,** 505 King Ave., Columbus 1, O.

For More Details Circle No. 417—Page 224

## Band Sander

Specifications, operating features and advantages of a band sander for pattern and woodworking shops are presented in folder.—**Mead Specialties Co.,** 4114 North Knox Ave., Chicago 41, Ill.

For More Details Circle No. 418—Page 224

## Hose Couplers

Bulletin 115 illustrates and describes heavy-duty, high-pressure hose couplings for air, steam, gas, hydraulic and liquid applications.—**Le-Hi Division, Hose Accessories Co.,** 2704 North 17th St., Philadelphia 32, Pa.

For More Details Circle No. 419—Page 224

## Material Handling

Broadside illustrates and describes several bridge, car and hand truck ramps, pallet stackers and torque hooks for material handling applications.—**Elizabeth Iron Works Inc.,** Box 360, Elizabeth, N. J.

For More Details Circle No. 420—Page 224

## Temperature Indicators

Features, specifications and ranges of several electronic Speedomax G potentiometer instruments for indicating thermocouple temperatures are presented in data sheet ND46-33(23). —**Leeds & Northrup Co.,** 4934 Stenton Ave., Philadelphia 44, Pa.

For More Details Circle No. 421—Page 224

## Vacuum Pumps

Construction, dimension, capacity, installation and performance details on rotary positive air and vacuum pumps, gas boosters and air motors are included in catalog No. 1957.—**Leiman Bros. Inc.,** 102 Christie St., **tric Co.,** 1806 Pine St., St., Louis 3,

For More Details Circle No. 422—Page 224

## Heavy-Duty Industrial Fans

Useful air-property data, in-use application photographs and general information on industrial fans, blowers and exhausters are included in bulletin 502.—**Robinson Ventilating Co.,** Zelienople, Pa.

For More Details Circle No. 423—Page 224

## High-Speed Drills

Diameters, lengths and proper uses of flat twisted and rolled section, high-speed drills are covered in 54th catalog.—**Hi-Duty Drill Works,** Fleetwood, Pa.

For More Details Circle No. 424—Page 224

## INDICATING PYROMETERS

Medium resistance pyrometers (4 ohms per millivolt) are available in 21 standard ranges. Maximum sensitivity for a pyrometer connected to one thermocouple is 300° F for full scale deflection. Standard ranges begin with minus 400 to 100° F and go up to zero to 3000° F. Full scale accuracy of two per cent is standard, although one per cent may be obtained. Styles available include panel mounting, portable and bench models. Made by **Assembly Products Inc.,** Chesterland, O.

For More Details Circle No. 425—Page 224

## VIBRATORS

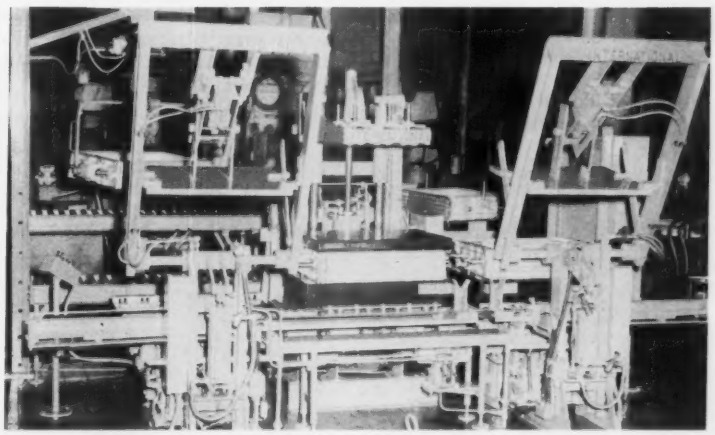
Series of Vibrolators that operate in any position or environment on steam, compressed air or gas (smaller units may be operated on vacuum) are made in ten sizes ranging from a few ounces to 15 lb for light vibrations or for vibrations of freight-car proportions. Inlet and outlet tappings are regular iron pipe threads. Bosses are located so that two street ells will allow supply and exhaust pipe or hose to enter or leave the Vibrolator in any direction. Made by **Martin Engineering Co.,** Neponset, Ill.

For More Details Circle No. 426—Page 224

## SNAGGING WHEELS

Fast metal removal and long grinding wheel wear is claimed for DA Borolon, high-speed, resinoid-bonded snagging wheels made with fused crystalline aluminum oxide. The small crystalline structure within

## Cope and Drag Unit Cycles Automatically



Cope and drag molding unit combines individual units into a pushbutton operation suitable for short runs or high production with all movements automatic and the cycle controlled and adjustable to meet all requirements. Machines are made in ranges of sizes to handle 750 to 10,000-lb molds.

Three machines—one rollover and two double jolt machines—are combined with weight frames and weights, conveyors and shuttle cylinders to operate the complete molding cycle. A three-man crew can handle the operation—a cope operator, a drag operator and a closer.

Cope operator places cope flask on pattern board, dumps in sand from overhead hopper and pushes button to initiate a series of operations to prepare the cope for shuttling to the rollover unit. After rollover, a slow draw action starts and, as a vibrator is shut off, a quick draw is completed. Push-off cylinders move mold to conveyors and empty cope pattern rolls back to shuttle side of rollover unit.

Drag operator completes the same cycle of automatic operations for the drag. The mold closer hooks bail on cope mold, picks it up and rolls it over by hand-operated hoist. Drag mold rolls under raised cope and operator closes the mold. Cores, if any, are set in place before the mold is closed.

Conveyor may be extended any desired length for proper spacing. Patterns can be changed quickly by using common width pattern boards. Timing cycles can be set to meet varying requirements. Made by **International Molding Machine Co.,** La Grange Park, Ill.

For More Details Circle No. 466—Page 224

each abrasive cutting particle is claimed to provide inherent toughness to resist fracture during grinding stress and more and sharper cutting edges on the wheel face. Made by **Simonds Abrasive Co.**, Tacony & Fraley Sts., Philadelphia 37, Pa.

For More Details Circle No. 427—Page 224

## CORE COATING

Super-Z (powdered zircon) core coating has a fusion point of over 4000° F and reportedly is an ideal working companion on those jobs employing cold set binders. Its white color permits easy visual checking of coating thickness and ease in setting cores in molds. Made by **Frederic B. Stevens Inc.**, 1800 Eighteenth St., Detroit 16, Mich.

For More Details Circle No. 428—Page 224

## PITCH ELECTRODE NIPPLE

Improved electrode column joint efficiency in electric furnace operations is claimed for a pitch-impregnated "Unitrode" nipple. Nipple is partially impregnated with a zone of pitch which covers the outside of the nipple and permeates down to a predetermined depth. Inside the zone, the nipple remains porous. When the electrode is in operation, the pitch melts. The air in the porous center of the nipple expands, forcing the liquid pitch throughout all the threads. As the electrode column heats, the pitch cokes out, strengthening the threaded joint and improving the bond. The tighter joint reduces breakage and electrical resistance. Made by **Electrode Division, Great Lakes Carbon Corp.**, 18 East 48th St., NewYork 17, N. Y.

For More Details Circle No. 429—Page 224

## PATCH CEMENT

High-temperature cement for hot patching sidewalls of soaking pits minimizes the production time ordinarily lost in the patching process. Cement is best applied with a pressure air gun but a long-handled paddle can be used. All that is necessary is to remove ingots from the pit and cut off fuel prior to application of the cement. Material is packed in 100-lb bags for air gunning and in wet form in steel drums for application by paddle. Made by **Walsh Refractories Corp.**, 101 Ferry St., St. Louis 7, Mo.

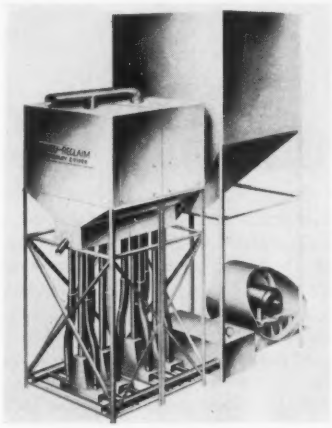
For More Details Circle No. 430—Page 224

## Reclaims Sand for Small and Large Foundries

SAND RECLAMATION unit for both large and small foundries features equipment that can be integrated readily with overhead sand handling and storage systems. For the small foundry without an overhead sand system, the unit is available as a "package" system. This compact system requires a floor area of about 14 x 21 ft and headroom of 21 ft. The package system is serviced by a front-end loader and provides for receiving, magnetically separating, elevating, lump breaking, screening, feeding, scrubbing and temporarily storing the reclaimed product.

The Pneu-Reclaim unit has a level-flow design that permits feeding by gravity, and control of quantity and quality is achieved by a simple discharge setting. No variable speed feeding devices are required.

Other features: Advanced-design scrubbers are built in basic 2-compartment units joined in sequence to create 2, 4, 6 or 8-compartment scrubbers; wearing parts are exposed to view; vertical tubes are replaced easily and rapidly by one man; reflectors are mounted independently of their vertical tubes and are replaced through inspection doors; sand-air balance is established by damper-like controls, and inlet and outlet openings are located below operating level of sand in compartments at all times. Made by **Beardsley & Piper, Division of Pettibone Mulliken Corp.**, 2424 North Cicero Ave., Chicago 39, Ill.



For More Details Circle No. 467—Page 224

# LITERATURE

## Industrial Solid Tires

Descriptions, illustrations, comparative test data and preventive maintenance recommendations for industrial solid tires are found in catalog MR-457. A supplement to the catalog, bulletin 457-A, lists current specifications for almost all makes of lift trucks and can serve as a reference guide to select the proper type and size of solid tires for specific trucks. —**Monarch Rubber Co.**, 428 Lincoln Park, Hartville, O.

For More Details Circle No. 431—Page 224

## Induction Heating

Booklet, "Dr. Northrup's 'Fireless-Wireless' Furnace," covers the history of high-frequency induction heating from the earliest work in 1916 through the introduction of working models, early commercial stages, development and refinement to the present where it remains a potent tool in the ever-expanding advances in industry.—**Ajax Electrothermic Corp.**, Box 877, Trenton 5, N. J.

For More Details Circle No. 432—Page 224

## $CO_2$ Binder

Bulletin F-130 highlights the characteristics of a binder formulated for the $CO_2$ process as well as the details of five other products for use with the process.—**Frederic B. Stevens Inc.**, 1800 Eighteenth St., Detroit 16, Mich.

For More Details Circle No. 433—Page 224

## Tooling Plastics

Bulletin EP-56-65 (Mod. 2) announces a new plastic material, Epocast 11B, which can be cast in any thickness yet possesses an extremely low shrinkage. The exotherm of the material in any thickness will never exceed 200° F.—**Furane Plastics Inc.**, 4516 Brazil St., Los Angeles 39, Calif.

For More Details Circle No. 434—Page 224

## Control Panels

Form PAN 1156 illustrates and describes company's floor, wall and generator-mounted control panels built for use with KATO generator and motor generator sets.—**Kato Engineering Co.**, Mankato, Minn.

For More Details Circle No. 435—Page 224

## Snagging Wheel

Features and general information on Sterdense snagging wheels for stand and swing frame casting grinding are provided in form S108.—**Sterling Grinding Wheel Co.**, Box 801, Tiffin, O.

For More Details Circle No. 436—Page 224

## Hand Lift Trucks

Book, "Mechanical and Hydraulic Hand Lift Trucks," contains basic in-

# For Foundrymen

formation on the selection and use of hand lift trucks. Schematic operating diagrams are shown and general operation information is presented.—**Association of Lift Truck and Portable Elevator Manufacturers,** Suite 759, One Gateway Center, Pittsburgh 22, Pa.

For More Details Circle No. 437—Page 224

## Material Handling Films

Catalog lists over 60 material handling films (educational and training) offered for loan by member companies of the Material Handling Institute.—**Material Handling Institute Inc.,** Suite 759, One Gateway Center, Pittsburgh 22, Pa.

For More Details Circle No. 438—Page 224

## Conversion Factors

Wall chart of conversion factors includes common conversions such as inches to centimeters or watts to horsepower as well as many conversions that are difficult to locate in reference manuals.—**Precision Equipment Co.,** 3716 North Milwaukee Ave., Chicago 41, Ill.

For More Details Circle No. 439—Page 224

## Engineering Service

"Maximum Automation Potential" brochure explains a free engineering service to predict performance of abrasive belts on any metal removal operation (except snagging operations) in advance of any expenditure for materials or equipment.—**Carborundum Co., Coated Abrasives Division,** Niagara Falls, N. Y.

For More Details Circle No. 440—Page 224

## Shell Molding News

No. 14, *Durez Shell Molding News,* contains general information on progress of shell molding with some pointers for producing shell cores. Excerpts from field reports of representatives are included.—**Durez Plastics Division, Hooker Electrochemical Co.,** North Tonawanda, N. Y.

For More Details Circle No. 441—Page 224

## Centrifugal Collectors

Design details, specifications, dimensional drawings and applications for Series C centrifugal collectors (two design types, 41 different sizes) are offered in form C-1.—**Kirk & Blum Mfg. Co.,** 3108 Forrer St., Cincinnati 9, O.

For More Details Circle No. 442—Page 224

## Drill Presses

Bulletin describes complete line of floor, bench, single and multiple spindle drill presses in several basic sizes to meet production and shop requirements.—**Delta Power Tool Division, Rockwell Mfg. Co.,** 470 N. Lexington Ave., Pittsburgh 8, Pa.

For More Details Circle No. 443—Page 224

## HYDRAULIC PUMPS

Series of balanced vane hydraulic pumps supply rated deliveries of up to 100 gpm at speeds up to 1800 rpm. Pumps are made with either clockwise or counter clockwise shaft rotation. Shaft rotation is changed by indexing the cam ring to a dowel pin hole with a narrow indicating the desired direction of rotation. Pumps may be face, foot or flange mounted in any of four positions on its mounting bracket. Made by **Denison Engineering Division, American Brake Shoe Co.,** 1186 Dublin Rd., Columbus 16, O.

For More Details Circle No. 444—Page 224

## X-RAY UNIT

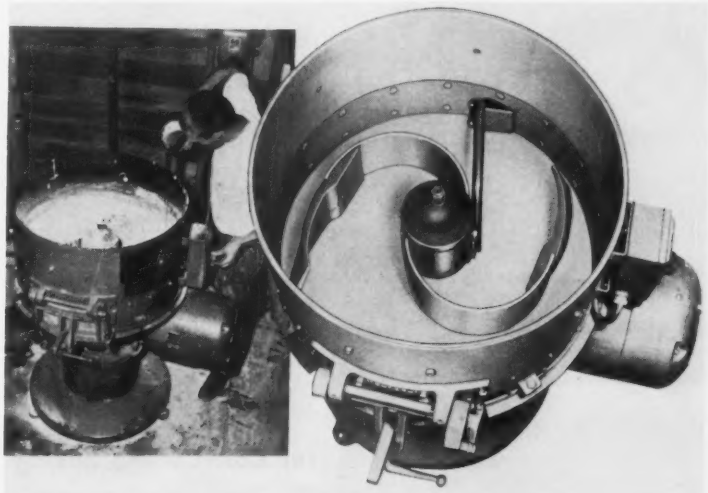
X-ray unit for portable radiographic inspection has a rated capacity of 200,000 volts and its low inherent infiltration puts it in the realm of an all-purpose field unit. Its head weighs 85 lb. Range of materials it will radiograph extends from thin magnesium sheet to 3 in. of steel. The x-ray head is elastically supported within the housing to make it shockproof and, as it is completely sealed, it is waterproof, dustproof and weatherproof. Because of its simplified control panel, the unit does not require a trained operator. Made by **Balteau Electric Corp.,** Stamford, Conn.

For More Details Circle No. 445—Page 224

## EYE-SAVER SWITCH

"Eye Saver Switch" to provide safety for operators of grinders, sanders, etc., is activated by either a standard pair of goggles or a standard face shield. When the mechanic removes the goggles or face shield from the switch, the machine goes on. When he replaces the goggles or the shield, the machine goes off. The switchbox controlling the machinery is maintained in the off posi-

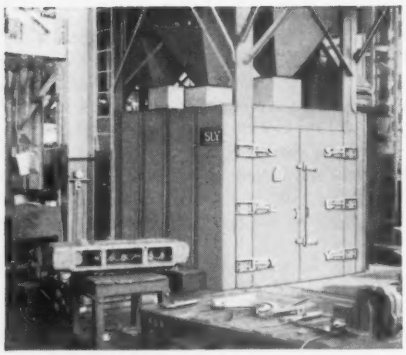
## $CO_2$ Sand Mixer Uses Spring Steel Arms



Sand mixer for sodium-silicate-bonded, resin-coated and oil-bonded sands is equipped with flexible, spring steel arms that move sand against mixer walls, where it is squeezed and rubbed upwards until it falls back into the center of the pan, where it is again caught up by the whirling arms to go through another mixing cycle. This action is said to offer fast mixing without crushing or heating the sand and to produce a consistently uniform mixture. The mixer is said to be suited ideally for sodium-silicate sand mixes.

Model 300, shown here, handles batches weighing up to 300 lb. Its discharge door is 28 in. above the floor—high enough to accommodate a 3-cu-ft wheelbarrow. Other features are a totally-enclosed, fan-cooled, 5-hp motor with overload protection directly connected to gear reduction unit. The mixer occupies minimum floor space, does not require a foundation and is moved easily by fork lift truck. A rubber liner around bottom of tub facilitates cleaning. Mixers with 100 lb (2-hp motor) and 600 lb (10-hp motor) capacities also are available. Made by **Federal Foundry Supply Co.,** 4600 East 71st St., Cleveland 5, O.

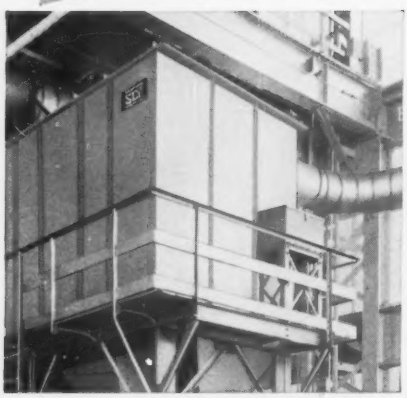
For More Details Circle No. 468—Page 224



**BLAST ROOMS**
***for Complete Cleaning***

Product surfaces must be clean to insure good results the *first* time. Sly — builder of blast rooms for 50 years — has the know-how to insure the right blast room for every job. Tough and rugged . . . the operators' choice because they are engineered to insure proper ventilation. Built in all types and sizes. Completely automatic abrasive handling systems.

**SLY FOR SAVINGS**
**DOWN THE LINE**



**DUST FILTERS**
***for Dust-Free Efficiency***

World-famous Sly Dust Filters insure 99.9% plus efficiency on all types of dust-collecting jobs; in foundries, machine shops, chemical plants, cement mills, etc. A complete range for either continuous or intermittent operation.

**CORE OVENS**
***for Cost-Cutting Baking***

Sly Ovens bake cores evenly . . . produce stronger, better cores with less scrap. Users report *two to three times more production*. Efficient air distribution, uniform temperature and correct exhaust assure consistently excellent results.

***Write for Complete Information***

*Designers and Manufacturers of: Dust Control Systems, Industrial Ovens, Blast Cleaning Equipment, Tumbling Mills.*

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OFFICES IN PRINCIPAL CITIES


tion by the glasses or the shield. The mechanic is forced to grasp the glasses or the shield before he can start the machine. Distributed by **Harold Dessau Inc.**, 25 Murray St., New York 7, N. Y.

For More Details Circle No. 446—Page 224

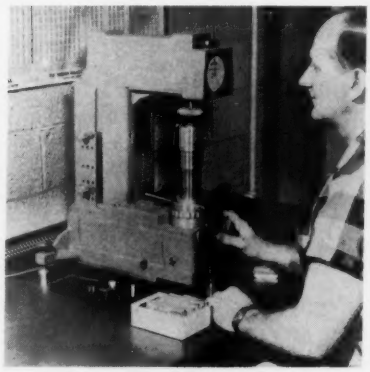
## CLEANING TISSUES

Chemically treated lens cleaning tissues can be used on eye and safety glasses, goggles, masks, camera lenses, mirrors, etc. Tissues are nonabrasive, harmless to the skin and possess nonfogging and nonsteaming properties when used with water. Suitable cleaning stations, including tissue dispensers, water bottles with spray pumps, mounting brackets, locks and keys are available. Made by **Carhoff Co.**, 11706 Kinsman Rd., Cleveland 20, O.

For More Details Circle No. 447—Page 224

## HARDNESS TESTERS

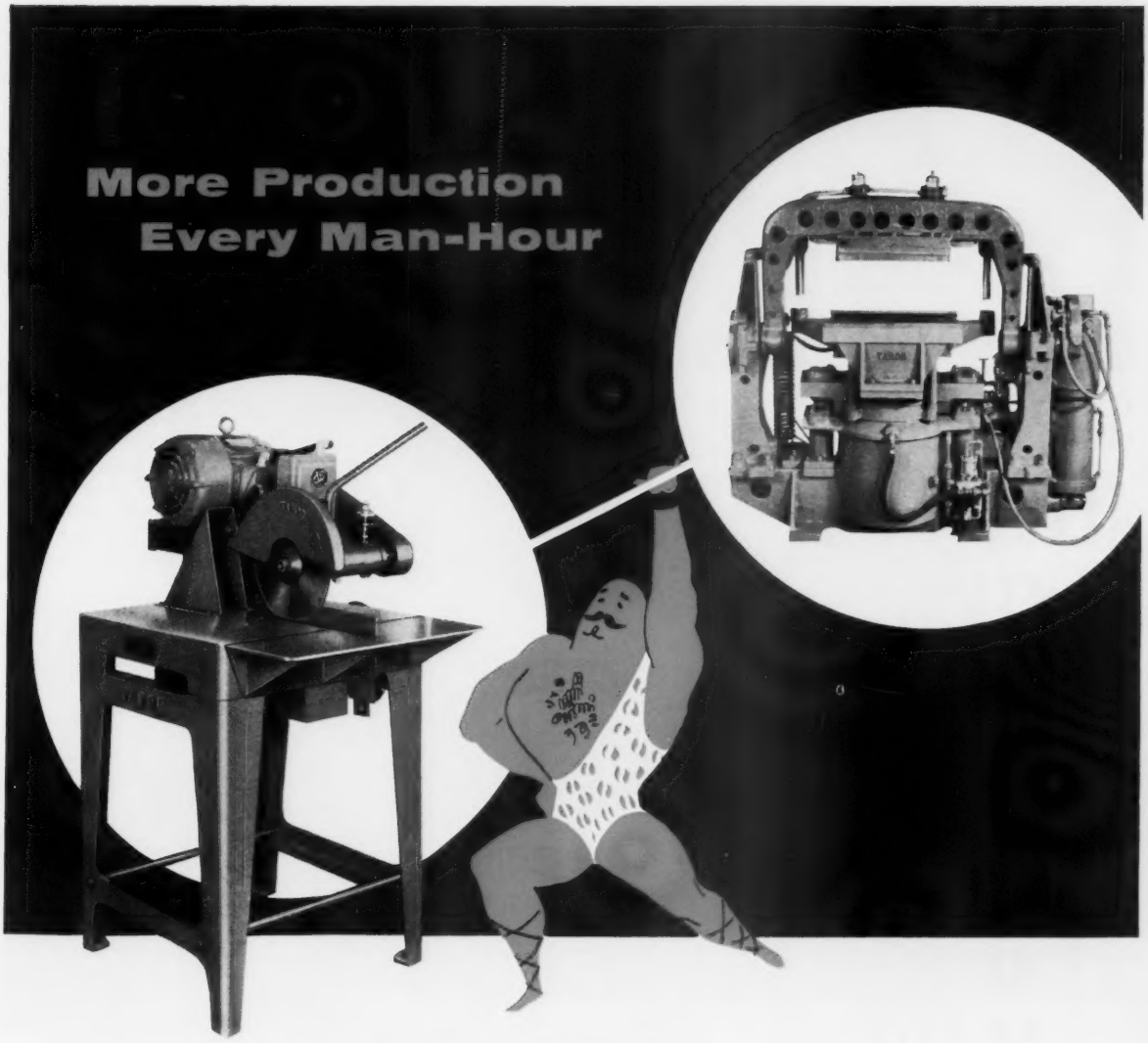
Motorized combination hardness testers are supplied in 8 and 12-in. vertical capacities as standard models or in 4 and 16-in. vertical capacity units by special order. In addition to high-production applications, the testers can be used for laboratory work where only a few tests per hour are made. Standardized results are achieved by eliminating the "human element" from the application and removal of the major load. The machines can make tests on all Rockwell regular and superficial scales. Made by **Torsion Balance Co.**, Clifton, N. J.



For More Details Circle No. 448—Page 224

## DIP COATINGS

Four dip compounds are for use as finish coatings in zinc and cadmium plating and are suitable for hand-operated still tanks, barrels and fully automatic machines. Dry dip compound 1085 gives a bright, clear coating to zinc plate and is considered ideal for products plated in




## with Tabor Mechanized Muscles

When you add Tabor Molding and Cut-Off Machines to your foundry, it's like stretching every man-hour into extra minutes of profitable production. Manual operations that used to take tedious minutes now are completed in comparative seconds. That means more time for more operations, to produce more profit.

For instance, the precision-engineered Tabor Stack Molding Machine teams perfectly with the new synthetic molding sands and new flask equipment . . . gives fast, easy operation, perfect alignment between yoke and squeeze head, sharply-reduced scrap losses.

Tabor-Brasive Cut-Off Machines will cut practically any metal — even tough materials like nodular iron and titanium. Finish-grinding costs are low, and the machines need almost no maintenance.

If mechanized muscles would step up your production, write today for literature, or ask to see the Tabor man. No obligation, of course.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

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**THE TABOR MANUFACTURING CO.**
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SUPER ALLOY CONTROL

*in the palm of your hand with...*

FANSTEEL REFRACTORY METAL PELLETS

Low cost, readily available, high density, low gas content, easily handled, and . . .

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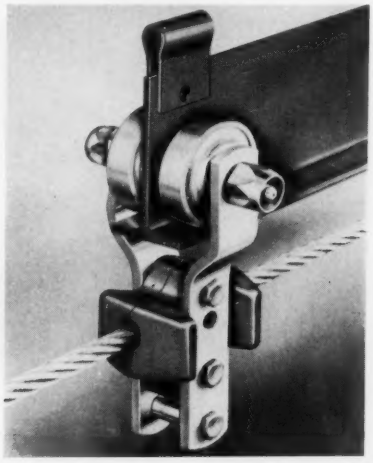
NORTH CHICAGO, ILLINOIS, U.S.A.


bulk. It is a leachless, chromate type dip with exceptionally long tank life. Compound 1090 has same properties as the 1085 compound but is furnished as a liquid concentrate and used in solutions of 50 volumes to one. Compound 1084 is adapted especially to finishing cadmium-plated parts but also can be used with zinc plating. It is particularly suitable for finishing thin-plated bulk work in either hand-operated or automatic lines. Compound 99 is a liquid version of 1084. Made by **Metal & Thermit Corp.**, Rahway, N. J.

For More Details Circle No. 449—Page 224

## HEAVY-DUTY TROLLEY

T-10 heavy-duty trolley for use with the ⅜-in. Bush-Lock overhead cable conveyor is equipped with wheels featuring pressure lubrication, a nut to protect the grease fitting, a completely enclosed back and a

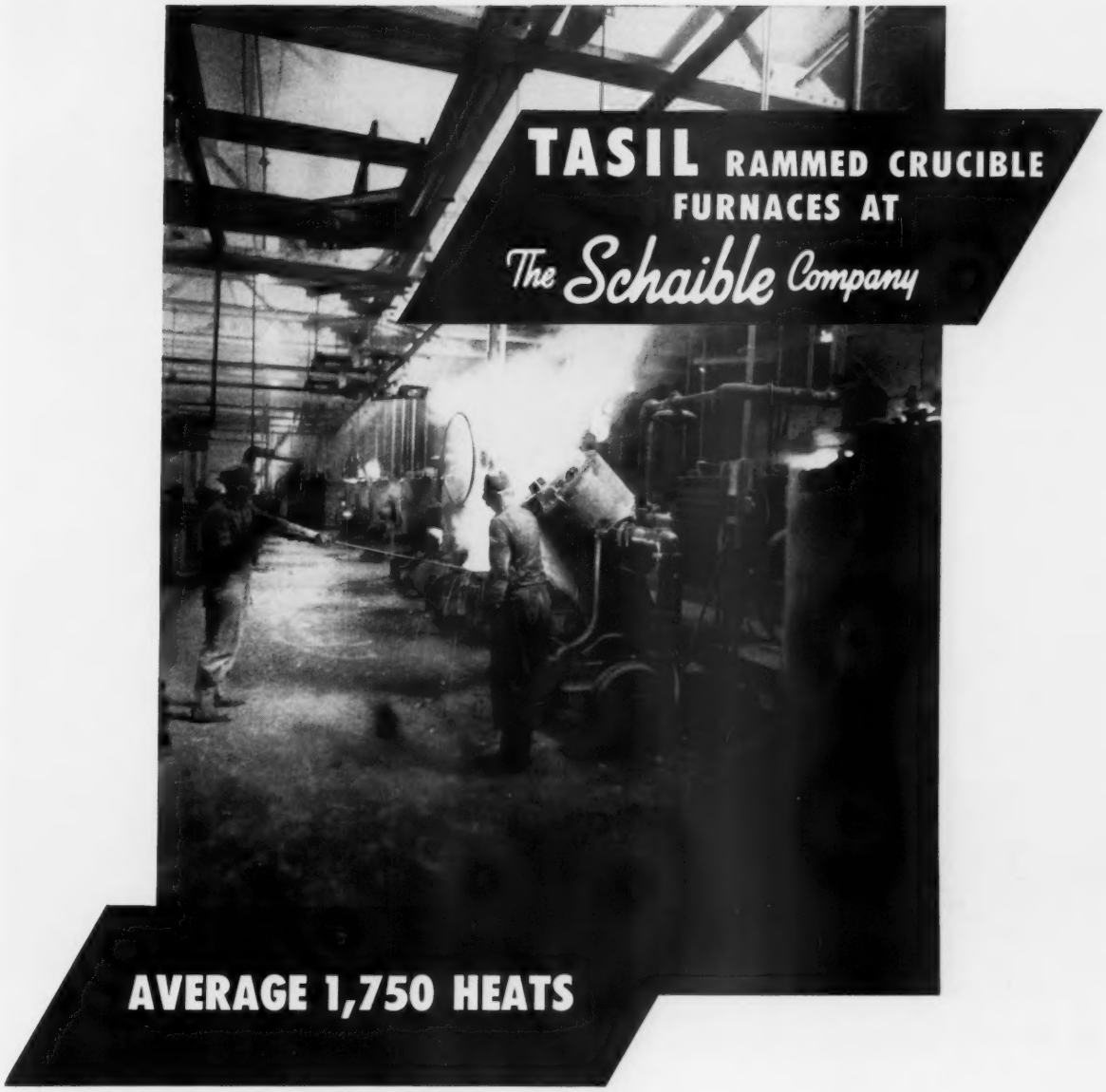


felt hub seal. The design is recommended for applications where dust, moisture or temperatures up to 150° F are encountered. For higher temperatures, a special seal can be substituted. Two- and four-wheel models with capacities of 250 and 375 lb, respectively, are available. Made by **E. W. Buschman Co.**, Clifton and Spring Grove Aves., Cincinnati 32, O.

For More Details Circle No. 450—Page 224

## STREAM SPLITTER

Stream splitter is designed to divide a single stream of dry, free-flowing material into two to eight separate, uniform streams. Material enters the top of the unit, where it strikes an impeller rotating at approximately 300 rpm. The impeller agitates material into a continuous whirl which settles evenly in the various outlets. Leather brushes on lower end of drive shaft sweep material into outlets. The unit has a




The Schaible Company, Cincinnati, Ohio, leading producer of plumbing and heating equipment, has standardized on Taylor Sillimanite #213 Ramming Mix for lining this battery of 17 #600-M Campbell-Hausfeld gas-fired crucible furnaces melting 700-pound heats—#275 crucibles. Tests have proved to Schaible that Taylor Sillimanite (TASIL) linings last longer, require less patching.

One TASIL rammed lining ran 2,051 heats of plumbing brass per lining. The average is approximately 1,750 heats. On a semi-continuous operation this means 1½ to 2½ years' service with a minimum of patching. This compares to 565 heats average for silicon carbide special shape linings with insulation backup. After considerable testing of other refractories, some cheaper, some more expensive, TASIL #213 Ramming Mix is the standard refractory lining.

TASIL works equally well in other types of crucible and barrel-type metal melting furnaces. Recommended for either gas or oil firing. Write for your free copy of Bulletin #315.

**Exclusive Agents in Canada:**
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TAYLOR ZIRCONI TAYLOR SILLIMANITE

The **CHAS. TAYLOR SONS Co.**
A SUBSIDIARY OF NATIONAL LEAD COMPANY
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REFRACTORIES SINCE 1864 • CINCINNATI • OHIO • U.S.A.

heavy-gage steel housing with a dust-proof, clear plastic observation window. Machine is V-belt driven from a ¼ or ⅓-hp motor and has a safety relief clutch with shear pin. Made by **Sprout-Waldron & Co.**, Muncy, Pa.

For More Details Circle No. 451—Page 224

## LUBRICANT PUMP

Air-motor operated lubricant pump incorporating a steel cover can be clamped rapidly to any standard 25 to 50-lb original refinery container. Manufacturer claims the pump will develop grease pressure 50 times greater than air line pressure. The pump is equipped with a 6-ft-high pressure hose and control valve with

curved extension for contacting hard-to-reach fittings. Made by **Lincoln Engineering Co.**, 5702-31 Natural Bridge Ave., St. Louis 20, Mo.

For More Details Circle No. 452—Page 224

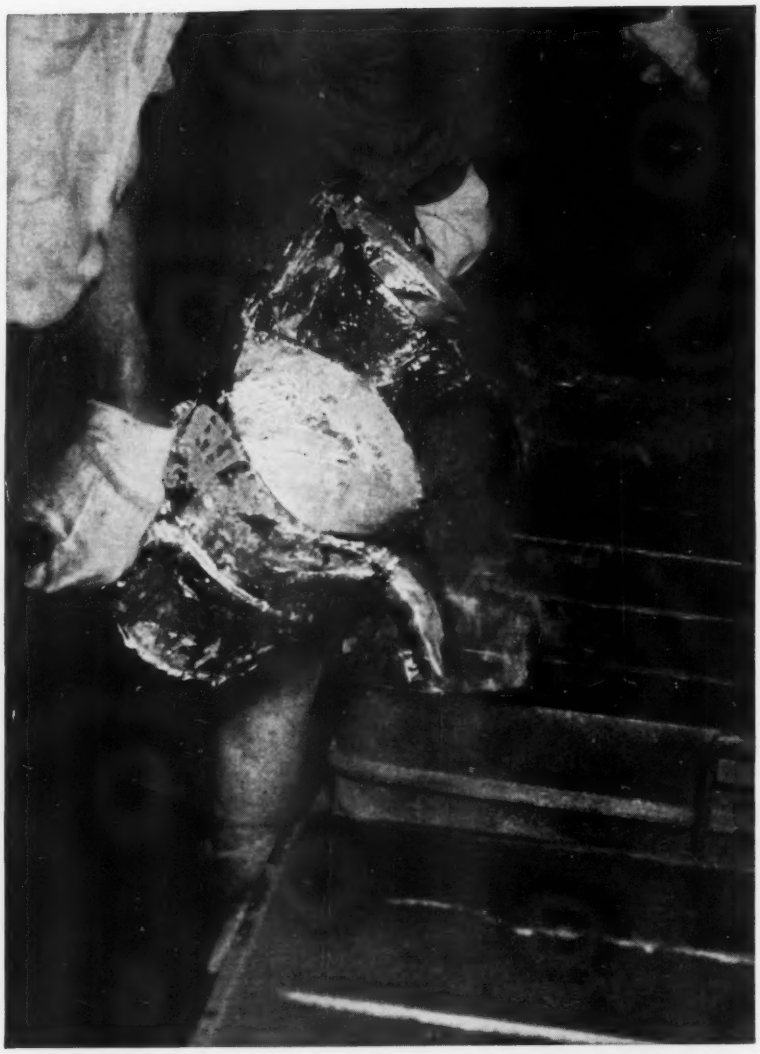
## AIR OR GAS STRAINER

Series 137 all-brass strainer is for applications requiring fine straining of air or gases and is particularly suited for keeping regulators clean. Removable element is indestructible porous bronze which effectively strains out particles 0.004 in. and larger (90 microns). It is available in pipe sizes ¼, ⅜ and ½-in. The strainer can be used at pressures up to 500 psi. Made by **Watts Regulator Co., Industrial Division**, Lawrence, Mass.

For More Details Circle No. 453—Page 224

## WORK LIFT

Lifting device has 3000-lb capacity and provides controlled lifting and positioning by a crank balancing hoist that can be tilted at any convenient angle. Machine shops and assembly lines use the unit for set-up; foundries use it for lifting



Here are our published performance specifications for Federated Tenzaloy: Castings aged 10-14 days at room temperature.

| | |
|---|---|
| Tensile strength | 35,000 psi |
| Yield strength | 25,000 psi |
| Elongation (in 2 in.) | 4-5% |
| Brinell Hardness No. | 74 |
| Impact strength (Charpy in ft.-lbs.) | |
| Notched | 3 |
| Unnotched | 14 |
| Electrical Conductivity | 35% |

*Federated* products:

**Aluminum, Babbitts, Brass, Die Casting Metals, Fluxes, Lead and Lead Products, Magnesium, Plating Materials, Solders, Type Metals, Zinc Dust**

# Do you hear meaningless claims when you buy self-aging Aluminum Alloys?

Federated Tenzaloy is the most widely used of all high-strength, self-aging aluminum alloys because it has the highest yield strength, and it has the best all-around combination of properties. Yield strength is the true measure of a metal's ability to take punishment, regardless of other claims that are made.

When you buy Federated Tenzaloy, you can be sure it will perform as well as its specifications indicate. Tenzaloy is produced under the strictest quality-control procedures, developed by ASARCO's Central Research Laboratory, where refining and testing techniques control impurities to parts per million, if required.

Hundreds of foundries and manufacturers use Tenzaloy when castings with superior properties are desired — and to replace ordinary alloys which require additional operations to meet required properties.

Why not ask your Federated field man to tell you who uses this metal and how? He will be around to see you soon, and it will benefit you to talk to him.

Federated Metals

ASARCO

Division of

AMERICAN SMELTING AND REFINING COMPANY

120 Broadway • New York 5, N.Y.

In Canada: Federated Metals Canada, Ltd., Toronto and Montreal

tumbler lids and placing cores, and welding operators use it for positioning work pieces. The lift can be used also for handling heavy drums or other bulky containers. Made by **Tilt-O-Lift Co.**, 9510 Belmont Ave., Franklin Park, Ill.

For More Details Circle No. 454—Page 224

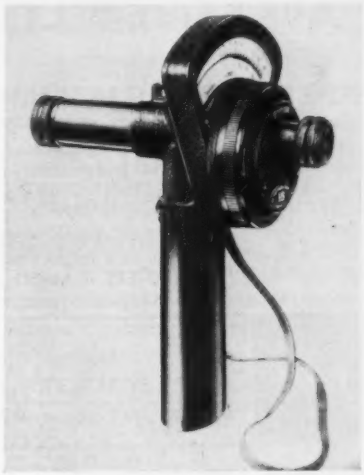
## GRINDING WHEELS

Duraflex grinding wheels are reinforced with strong fabric, bonded with resins and made with a depressed center for rough grinding, reducing heavy welds, undercutting and notching. In foundries, the wheel is handy for cutting off gates and risers and cleaning castings. Portable grinding wheels of similar construction, in standard as well as special specifications, also are available. Duraflex wheels designed specifically for cut-off operations are reinforced with Fiberglas. Made by **American Emery Wheel Works**, Providence 1, R. I.

For More Details Circle No. 455—Page 224

## OPTICAL PYROMETER

Partial radiation optical pyrometer, Pyropto, is used for measuring temperatures of glowing masses in



annealing, hardening and calcining furnaces, of molten or glowing metal or of red-hot ingots when forging, pressing or rolling. The instrument is operated by a built-in storage battery and its range is from 1300 to 6300°F. All parts are in a dust-proof housing. Imported by **Epic Inc.**, 154 Nassau St., New York 38, N. Y.

For More Details Circle No. 456—Page 224

## ELECTRODE CONTROL

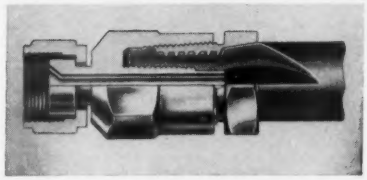
Regulator for electrode control of large electric arc furnaces is cap-

able of driving the electrodes at speeds and responses up to the limit that the motor can stand. Commutating ability of the motor limits electrode speed and response. The regulator for each electrode uses a reversing magnetic amplifier to control a motor-generator set. Signals of arc voltage and arc current are compared by the regulator. Magnitude and direction of the output depends on which of the signals is stronger and on the ratio of the signal strengths. Generally, the voltage provides the "lower" signal, current provides the "raise" signal. Made by **Westinghouse Electric Corp.**, Box 2278, Pittsburgh 30, Pa.

For More Details Circle No. 457—Page 224

## HOSE COUPLINGS

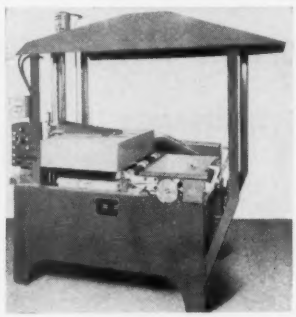
Medium-high and high pressure hydraulic hose and hose couplings feature a "double-wedge grip" that eliminates need for skiving rubber-covered, wire-braid hose. The couplings bite through the rubber cover, grip solidly on either single or double wire-braid hose without weakening the protective cover or the waterproofing qualities of the hose. Hose has an operating range from minus 40 to 275°F. Burst range is from 1400 to 18,000 psi. Made by **Alemite Division, Stewart-Warner Corp.**, 1826 Diversey Pkwy., Chicago 14, Ill.



For More Details Circle No. 458—Page 224

## SHELL MOLDING MACHINE

Shellmaster SAL-1 automatic shell molding machine has a 20 x 30 in. pattern size with adapters available for fitting smaller patterns. Equipment is available in two standard sizes with manual, mechanized and automatic operation. Dwell time is rated at 6 to 8 seconds with curing time rated at 15 to 25 seconds. Heating is done with electricity or gas. The machine measures 40 in. wide x 52 in. long. Sold by **Shell Equipment Co.**, Box 764, Connellsville, Pa.



For More Details Circle No. 459—Page 224

## HARDNESS TESTERS

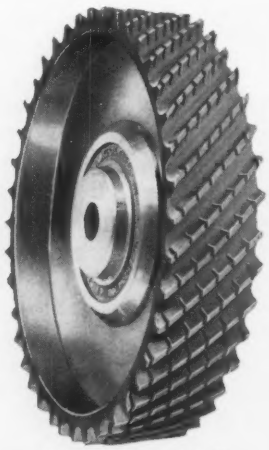
Reflex hardness testing machine with dead weight loads of 1 to 120 kg has an automatic load selection system, permitting the load to be imposed at touch of a button. It is possible to switch instantly to the correct magnetically-held indenter for a Vickers, Knoop, Grodzinski or Micro-Brinell test. Machine incorporates a Carl Zeiss projection system to eliminate measurements with a microscope. Projected screen image may be enlarged 70 to 140 times.

A micro-reflex hardness tester is equipped with dead weights ranging from 10 g to 3 kg and also uses the Zeiss optical system and viewing microscope. Indentations may be


# A BETTER BACK-UP WHEEL

# R57

## FOR YOUR ABRASIVE BELTS



"X" serration used for moderate contour work

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14"

| TYPE | WIDTH OF FACE 1" | 2" | 3" | 4" |
|---|---|---|---|---|
| PLAIN | 32.00 | 34.00 | 36.00 | 38.00 |
| SERRATED | 37.00 | 39.00 | 42.00 | 44.00 |

Available in Plain or Serrated Face in All Durometers

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45° Scoop Tooth — Aggressive Stock Removal

45° Standard — Stock Removal

Slit Serration — Aggressive Contact Work

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## How planned test procedures

# improve foundry profits

To expand the market for castings, foundrymen gain by impressing their customers with the importance of better designs and realistic specifications. If this is done at the outset, your own profit and your customer's continuing satisfaction are assured.

### Establish practical design standards

Determine, if possible, the true service requirements and practical characteristics your customer needs. Mutually establish a standard which satisfies the need at a reasonable cost. A good design must be satisfactory functionally, structurally and foundry-wise.

Good design insures trouble-free foundry practice, profitable operation and customer satisfaction. Castings with even stress flow are more serviceable and are easier to pour. Experimental stress analysis with Ⓜ Stresscoat brittle coatings lets you make design changes without guesswork or wasted effort. Design for service, easy casting and high profits.

### Keep your finger on the pulse of production

Ⓜ Magnaglo ( Ⓜ Zyglo for non-ferrous) is recommended as a "finger on the pulse" means of determining the causes of any cracking in the foundry. Simple tests immediately after shakeout or cleaning can locate cracks when they first occur. This permits you to take corrective action, no matter what the cause. With sampling inspection you actually control the quality of the entire run as it is being poured. You do not waste time and profits in handling, heat treating, finishing, or machining, intermittent lots of cracked castings. It all adds up to better products for the customers and higher profits for the foundry!

Write for details on how Magnaflux nondestructive testing methods can be employed to increase the yield of usable castings and foundry profits. No obligation, of course!

Lightweight Magnetic Particle

**Y-5 YOKE KIT**

Provides Portable Inspection

Uniform quality castings are far more important to foundry profits and customers than perfection. For this reason, many gray iron foundries have adopted the Y-5 Yoke Kit for magnetic particle inspection at stages of "in-process" operations. The Y-5 is easy-to-use, fast, light-weight, portable and *low cost!* It reliably detects handling cracks, hot tears and similar defects open to the surface. The Y-5 is a convenient and inexpensive means of checking pilot runs for cracks, or for inspecting local areas of castings after cleaning, machining, etc.

**COMPLETE KIT ONLY $195.00**

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*Circle 700 on Inquiry Card—Page 51*

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● Cleveland Chaplets provide you positive core support with the convenience of uniform stem and plates to speed molding. You'll find that their improved break-off design also reduces handwork to speed cleaning. You'll like the convenience of Cleveland service, too!

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OPEN COIL HEAD RADIATOR

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Uniform stems simplify molding, prevent annoying sand break-outs.

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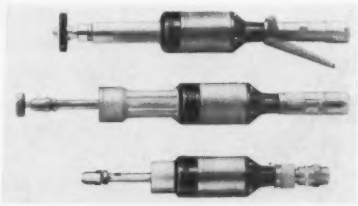
Circle 701 on Inquiry Card—Page 51

magnified up to 500 times. It may be used for Vickers, Knoop and Grodzinski tests on thin specimens and has the advantage of rotating the projected image through 90 degrees without disturbing the specimen. Made by **Gries Reproducer Corp.**, 125 Beechwood Ave., New Rochelle, N. Y.

For More Details Circle No. 460—Page 224

## AIR GRINDERS

M1170 series of small wheel air powered grinders is available on short, long and small end types. Prin-



cipal features are increased power, balanced centrifugal governor on all speeds, simplified construction for ease of maintenance and quiet operation. From a basic motor at three speeds, five spindles and three handles, 45 models and 20 different arbors and collets are available to choose from. Made by **Rotor Tool Co.**, 26300 Lakeland Blvd., Cleveland 32, O.

For More Details Circle No. 461—Page 224

## FORK TRUCKS

Speedlift line of all-hydraulic gasoline or liquefied petroleum gas operated fork trucks is reported to

reduce parts and maintenance costs as much as 95 per cent. Hydraulic design eliminates clutch, transmission, differential, drive shaft and differential axle. The design is said to be a step beyond fluid couplings, automatic transmissions and torque converter systems in its simplicity, elimination of components and efficiency. All controls and instruments are forward of the operator and the controls are at the operator's fingertips. Truck weighs 4380 lb and will spin and turn in its own length (over-all length less forks, 84 in.) as the rear wheel turns a full 90 degrees in either direction. Made by **Pettibone Mulliken Corp.**, 141 West Jackson St., Chicago, Ill.

For More Details Circle No. 462—Page 224

## OIL GROOVE MACHINES

Multiple oil grooves, either straight or helical, can be formed automatically on shaft bearing surfaces in a few seconds, at most, by the Roto-Flo process. Roto-Flo machines roll the oil grooves into the shaft journal in a single pass by means of toothed racks. When oil grooves are adjacent to splines on a shaft, they can be formed in the same pass as the splines, if desired. Made by **Michigan Tool Co.**, 7171 East McNichols Rd., Detroit 12, Mich.

For More Details Circle No. 463—Page 224

## DRUM HEAD CUTTER

Hand-operated cutter will cut the head out of a drum in two minutes.

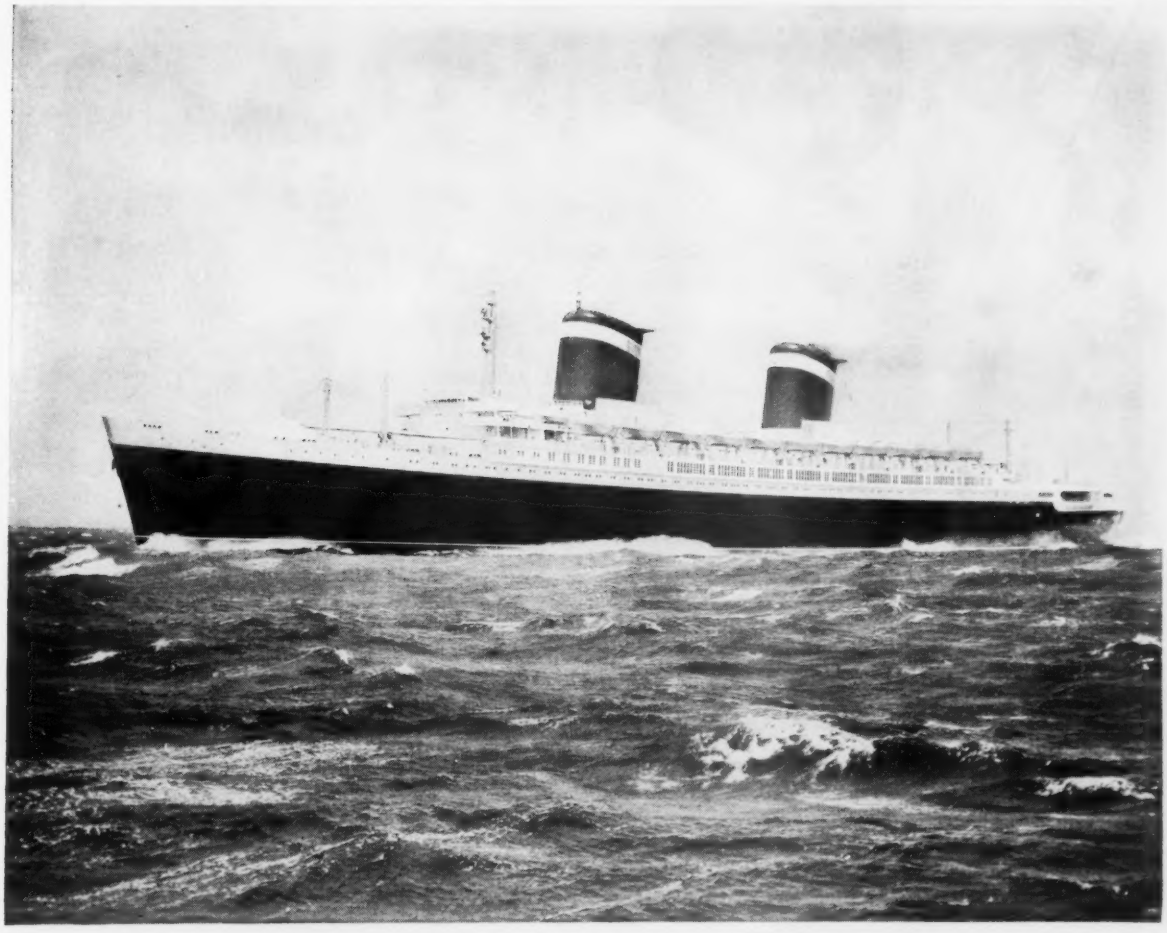
It can be used anywhere as it needs no electrical outlets or air connections. Cutter leaves a turned-in edge to avoid injury in handling the drum after cover is removed. Construction is sealed gear case with worm gear assembly. Adjusting bar also is the stabilizing bar and is threaded into the main housing. Ample bearing capacity is provided for hard service and ease of operation. Made by **Michael A. Schinker Mfg. Co.**, 6514 South Western Ave., Chicago 36, Ill.

For More Details Circle No. 464—Page 224

## ROOF EXHAUSTER

Axial and centrifugal flow roof exhausters feature low contours and are made in a wide range of types and sizes. Motors are cooled by outside air. Rubber vibration isolators are designed for each size unit and motor speed. Dynamically balanced aluminum fan blades are designed for quiet operation. The centrifugal type features a nonoverloading backward curve fan that is sparkproof. Made by **Greenheck Fan & Ventilator Corp.**, Schofield, Wis.

For More Details Circle No. 465—Page 224



**OCEAN SUPERLINER**—Modern passenger vessels like this help America maintain its maritime supremacy. Castings are an integral part of the engines that power these ocean giants.

# TRULINE® BINDER MEANS SMOOTH SAILING FOR FOUNDRIES

Finished castings flow smoothly from your foundry and costly production delays are avoided when you use Truline Binder. No matter what production problems your foundry faces, you can count on Truline to help solve them. Cores molded with Truline are strong, collapse readily, and are easily removed by knockout or hydroblast.

Fast-baking Truline Binder eliminates oven bottlenecks, and minimizes repairs and welding that add to final casting costs. In the core room, in the molds, and in the cleaning room Truline Binder improves efficiency, reduces man-hours per ton. For information on how Truline Binder can mean increased production at lower cost, write:

HERCULES

*Pine Chemicals Division, Naval Stores Department*
HERCULES POWDER COMPANY
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*920 King Street, Wilmington 99, Del.*

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Circle 702 on Inquiry Card—Page 51

**HERE'S HOW!**

- **FASTER MELTING** — one 400 series melts up to 11,000 lbs. of brass or bronze per shift and 6,000 lbs. of gray iron per shift.
- **LOWER MELTING & MAINTENANCE COSTS**—One man can do all the melting work, no daily repairs needed.
- **BETTER FURNACE CONTROL AND VERSATILITY** — No pick-up of tramp elements, and furnace setting is never changed.
- **CONTINUOUS POURING** — no waiting until floors, flasks, boards, etc., are filled with moulds.
- **CLEANLINESS** — Reda Furnaces have passed the most stringent smog-control regulations.

**The Reda Furnace is a modern furnace design. It is sturdily constructed, without gadgets, for rugged operation. It is designed to give increased speed and efficiency in melting ferrous and non-ferrous metals. Use of Reda Furnaces has resulted in savings as high as 50% by foundries in various parts of the country.**

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**REDA PUMP COMPANY • BARTLESVILLE, OKLA.**

*Circle 703 on Inquiry Card—Page 51*

## *Haul Castings the Economical Sterling Way!*

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**FOUNDRY EQUIPMENT**

A 8530-1⅓


# *Meditations of a Sandman*

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

## "Sand Trouble?"

LET us pose a hypothetical case—which shouldn't really be classed as hypothetical because it actually happens to most of us at intervals too frequent for comfort. Instead, let's call it a prevalent occurrence.

We supposedly are dealing with a system green sand—that is, a uniform grade of mulled and aerated molding sand which contains a small ratio of new sand and at least 90 per cent return sand, plus bentonite, seacoal, woodflour and water, in amounts determined as correct according to current iron foundry sand practice. This sand is aerated at least once between muller and molder—preferably twice.

It may be transported by belt, front-end loader or any other means, as dictated by special requirements or plant facilities. We shall assume that for a period of two months, there has been no reason to complain of either moldability of the sand or the quality of castings. Then, quite without warning, trouble begins. Molder, foreman and superintendent complain of sand failure. (Each, of course, words his complaint in a slightly different manner, for "sand-failure" is in my book a word that covers a multitude of imponderables.)

The trouble may be scabs, blows, expansion streaks, rattails, buckles, washes, burn-ons, penetration, swells, gas holes, rough finish—even discoloration. But no matter how you label it, it still is sand failure.

There usually is no single cause for any one of these defects. The trouble could be—and frequently is—directly traceable to moisture imbalance, but it also could be due to other conditions, some of which might prove difficult to isolate. (That's why we have sand experts.)

For the purpose of this discussion, let's narrow the thing down a bit and consider a commonly experienced

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For elimination of down-time, easier steering, greater traction and longer life, switch to NOTATS. In sizes from 4.00 x 8 to 8.50 x 24. Write today for price list and further information.

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*Circle 706 on Inquiry Card—Page 51*

# USING TOO MUCH COKE?

Why not talk this over with one of our metallurgists with a view to taking advantage of the superior quality of Semet-Solvay Foundry Coke in reducing your melting costs.

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problem which would seem capable of solution by any foundryman of average intelligence.

Let's say that castings have become unusually rough, especially near both cope and drag joints. Some molders (but not all) complain of stickdowns, poor lifts or drops. The molders' hoppers at irregular intervals discharge clayballs which vary in size, but are soft, easily crushed, and hardly could be considered responsible for the effect encountered.

The trouble may be due to man, muller or materials. It also might be caused by the molder, his machine, his pattern or a number of other things. In order to avoid undue complexity, however, and to keep this article within bounds, let's confine ourselves to the three "Ms"—man, muller, and materials (The aerator usually is considered part of the muller). A fourth "M," moisture, should be the first consideration.

### Muller Man May Be Blameless

Despite the fact that the man at the muller sometimes has been grossly libeled as a moron, and is blamed daily for all the ills that sand is heir to, he nevertheless is in charge of your most important machine. You, in your wisdom, have placed him in this key position. Before you berate him for anything, just ask a few respectful questions, and you'll probably learn that he is conscientiously "sticking to the mix" as closely as humanly possible under the conditions you have provided.

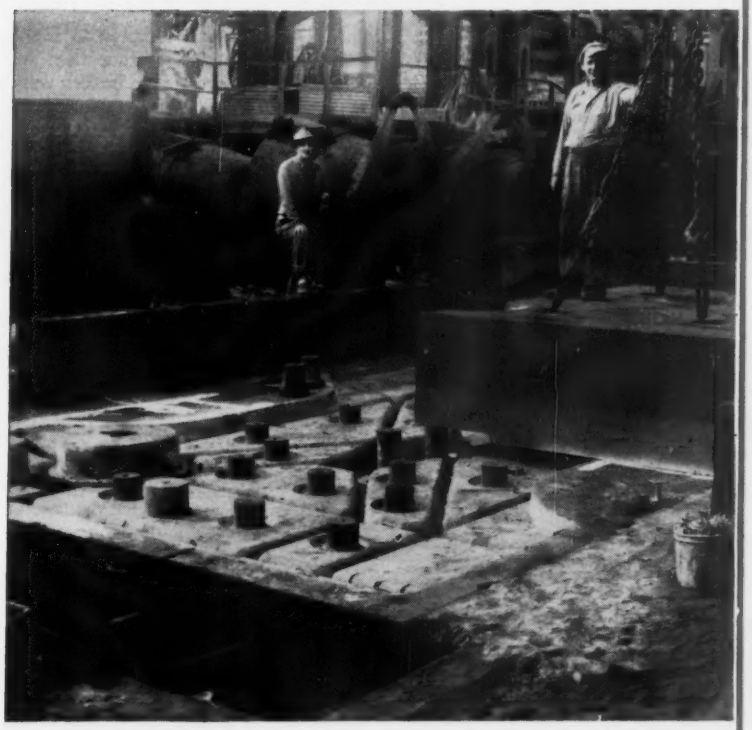
In trying to find the source of your clayballs, you first should check muller adjustments and performance. Are the wheels at the right height? Are plow-blades or baffles in need of replacement? Is the aerator functioning properly? Is the water meter telling the truth? O.K.? So we turn next to ingredients.

Have you recently received a new shipment of sand, clay, bentonite or pitch? Recent experience in some areas has proved conclusively that all western bentonite is not alike in quality or performance. A poor grade of this material may not necessarily produce clayballs, but it can create trouble, such as *washing*, which is infinitely worse than clayballs. When clay and water are improperly added or poorly mixed, a major source of balling exists; and in some instances an aerator can aggravate this condition.

One case in particular comes to mind. Prepared molding sand was being transported by front-end loader to the belt bin at a molding station, from which it was lifted by bucket conveyor and sent through an aerator into the molder's hopper. The molder

# KOLD-SET®

## COLD SETTING BINDER
## APPLICATION REPORT



Core making time was reduced 16 to 20 hours on this core with Kold-Set bonded sand. The mold pit shown contains 35 individual cores. Four cover cores, 10 tons each, make up the cope. Casting weight 160,000 lbs.

### *Problem:*

A large order was taken for platen castings with a definite delivery schedule to meet. Previous experiences in making this casting would prohibit maintaining this particular delivery promise. Excessive time in core making, core setting and shakeout were the problems that had to be overcome.

### *Solution:*

KOLD-SET was used exclusively in the making of this casting. KOLD-SET slab cores were used in the bottom of the pit and four (4) KOLD-SET cover cores were used as cope to replace the conventional dry sand cope.

### *Advantages:*

Core making time was reduced 16 to 20 hours; oven drying reduced 30%; Core setting, because of the accurate core dimensions, was reduced in excess of 50% (KOLD-SET cores fit almost perfectly). At shakeout all cores fall free of the casting. Rough cleaning was eliminated; finish cleaning time was reduced to a minimum.

# KOLD-SET

## COLD SETTING BINDER
## ADVANTAGES

### *Laboratory Control*

Only finest ingredients, in full measure are used to make Kold-Set Binder and Activator. Completely uniform manufacture, governed by scientifically controlled laboratory procedure makes Kold-Set consistent in quality . . . the unrivaled best cold-setting binder.

### *Engineering "Know-how"*

G. E. Smith engineers have the broad background of foundry experience necessary to apply Kold-Set to core and mold making problems intelligently. They are backed up with a thoroughly qualified, service-minded engineering and research organization.

### *On the job Assistance*

G. E. Smith service includes "in-plant" assistance in setting up the best method for making cores and molds with the equipment available. Engineers are qualified and equipped to recommend methods to achieve optimum results with Kold-Set at a minimum of expense.

### *Proved Performance*

The Kold-Set process not only greatly speeds core and mold making. It has been proved in plant after plant to produce uniform, more accurate cores and molds with excellent surface and dimensional stability. It produces better castings at lower overall cost.

**FOR FULL TECHNICAL DATA . . .**

Write for Technical Bulletins 2 and 3 for the complete story on the Kold-Set process and how it can drastically reduce mold, core and shakeout costs.

# G. E. SMITH, INC.

246 WASHINGTON ROAD — PITTSBURGH 16, PA.

ORIGINAL AND EXCLUSIVE MANUFACTURERS OF THE KOLD-SET PROCESS IN THE UNITED STATES.



Circle 708 on Inquiry Card—Page 51

found no fault with most of this sand, but at intervals he got a flaskful of soft clayballs which gave considerable trouble.

We followed and checked the prepared sand from the muller to the belt bin which fed the elevator buckets, but could find no unusual evidence of clayballs. Those of us involved argued at length from our respective viewpoints in defense of our cherished theories. Finally, someone, with surprising logic, suggested that we closely observe the action of our elevator buckets and of the aerator above the molder's hopper. This step was taken, but nothing incriminating or unusual could be found.

We then instructed the molder to be sure to notify us at the next appearance of clayballs. When this occurred, we climbed to the top of the hopper and, with the aid of a flashlight, watched the flow of sand as the hopper gate was operated.

As the hopper became half empty, a piping or funnel was created. It permitted the discharge of clayballs which had accumulated at the outer edge of the bin. As this hopper was being refilled, we noticed that the aerator, discharging directly toward the middle, was pyramiding the sand. As the rising apex reached a point just below the mouth of the aerator, there was a visible balling action as rolling bits of clay raced down the steep surface and rapidly increased in size until they lodged against the sides of the hopper. There they remained until the cone became a releasing funnel.

At first we were tempted to make changes in the aerator, but then we found that most of our aerators were built to perform in this manner and previously had given us no trouble. We then decided to reverse our blend of bentonites, going from two-thirds western to one-third and from one-third southern to two-thirds. We also reduced the water 0.2 per cent. Our clayballs disappeared immediately.

The foregoing account may seem like a long journey to travel a short distance, but with foundry sand troubles, as with criminal investigation, the detective must consider all leads, however questionable, before he finally apprehends the criminal. Even then, he frequently stumbles by accident on the evidence he needs. When sand gets out of line, no criminal element is more mystifying or reticent.

In a recent issue of "Brief Notes for Busy Foundrymen," Clyde Sanders is not disrespectful of science, but he does insist that in a diagnosis of sand failure, "at times it may be better to be a detective rather than a scientist."

In pursuing Clyde's detective theme a bit further, we might observe that the master detective of all time, Sherlock Holmes, was eminently successful mainly because Doyle invented the crime, carefully concealed all clues, then manipulated his puppet detective. The sand detective enjoys no similar advantage. When you know what is causing your sand trouble, you don't have to be a detective to solve your case.

## Book Shows Casting Drawings

Deemer Steel Casting Co. is offering a recently completed book of marine casting drawings of interest to marine designers, port authorities and engineers. Included are detail drawings of bitts, bollards, cleats and chocks of the Navy, American Marine Standard, American Bureau of Shipping, New York Dock and Lloyds International. Copies are available from the firm at Ninth and Washington Sts., New Castle, Del.


*6 ways to improve foundry efficiency*

Photo courtesy Palmyra Foundry Co. Palmyra, New Jersey

**...with J-M Transite Core Plates**

Transite Core Plates are smoothly sanded, made of asbestos-cement, specially designed by Johns-Manville for holding cores during baking or drying. They give you all these important advantages:

1. **Simplify Handling**—their light weight speeds production.
2. **Reduce Replacement**—last for years . . . won't crack, break or delaminate in normal usage . . . won't rust, rot or corrode.
3. **Assure Accuracy**—their low warpage assures flat surface.
4. **Save Cleaning**—resist adhesion of sand and core wash.
5. **Minimize Fire Danger**—made from asbestos, Transite won't burn . . . helps lower insurance rates.
6. **Save Money**—cost less, last longer than many other materials. Cut to your requirements in sizes up to 48" x 60". Write for free sample and further information. Address Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

**Johns-Manville TRANSITE®** AN ASBESTOS PRODUCT

# a new, LARGER investment casting furnace...

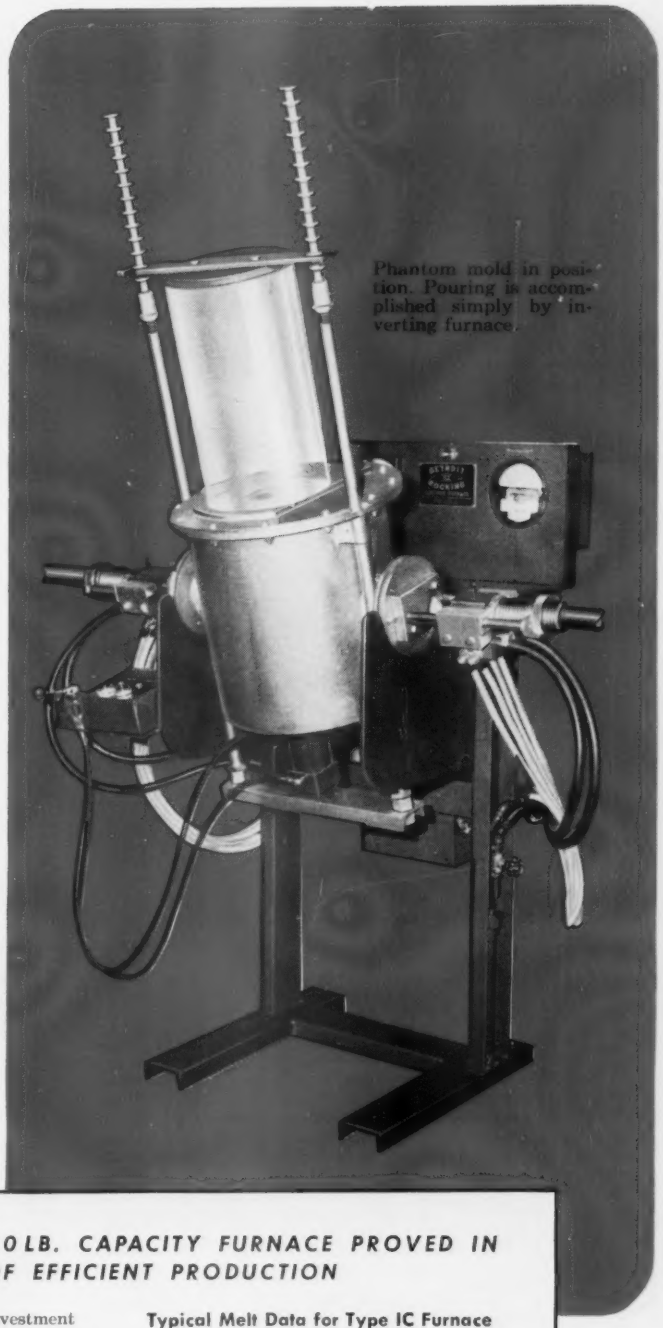
### THE 20 LB. CAPACITY, 20 KW.,

# ID

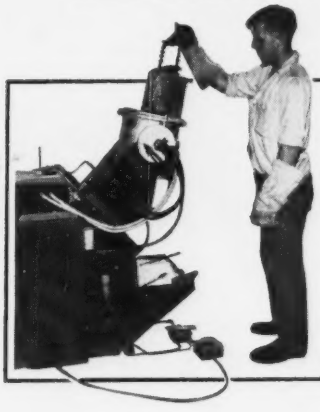
### Detroit Electric Furnace

Now, a direct-casting, indirect arc furnace for precision parts up to 20 pounds. The new Detroit Electric ID Furnace melts metal quickly, holds precise analysis, operates with great economy. When metal is ready, mold is clamped on and the furnace is inverted to pour the mold without further handling.

For full information on this great, new investment casting furnace, write us today.



Phantom mold in position. Pouring is accomplished simply by inverting furnace.



### TYPE IC, 10 LB. CAPACITY FURNACE PROVED IN 3 YEARS OF EFFICIENT PRODUCTION

Faster, better investment castings! That's the record of the IC Furnace, producing precision parts on a continuous schedule in many plants today. A high-quality production furnace!

**Typical Melt Data for Type IC Furnace**

| Metal | Wt. Charge | Average Melt Time | K.W.H./lb. Power Consumption |
|---|---|---|---|
| Stainless Steel | 6 lb. | 10 min. | .364 |
| Steelite | 5¾ lb. | 9 min. | .340 |
| Gray Iron | 6 lb. | 9 min. | .333 |
| Copper | 6 lb. | 5 min. | .203 |
| Yellow Brass | 6 lb. | 4½ min. | .179 |

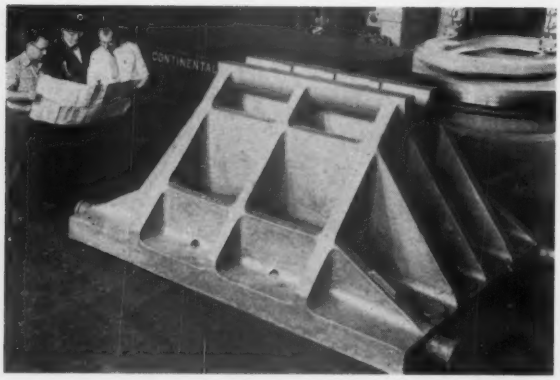
## DETROIT ELECTRIC FURNACE DIVISION

**Kuhlman Electric Company • Bay City, Michigan**

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N.Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D.F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham

# News Views

**OLDEST SALESMAN:** A testimonial luncheon honored the 80th birthday of C. F. Allison, oldest sales representative of W. C. Dillon Co., Los Angeles manufacturer of testing equipment. Mr. Allison has been selling for 62 years. Left to right, B. J. Vernagallo, plant manager; R. Surey, comptroller; G. A. Dillon, sales manager; E. I. Dillon, treasurer; Mr. Allison; G. P. Dillon, assistant chief engineer; and R. E. Dillon, vice president in charge of sales



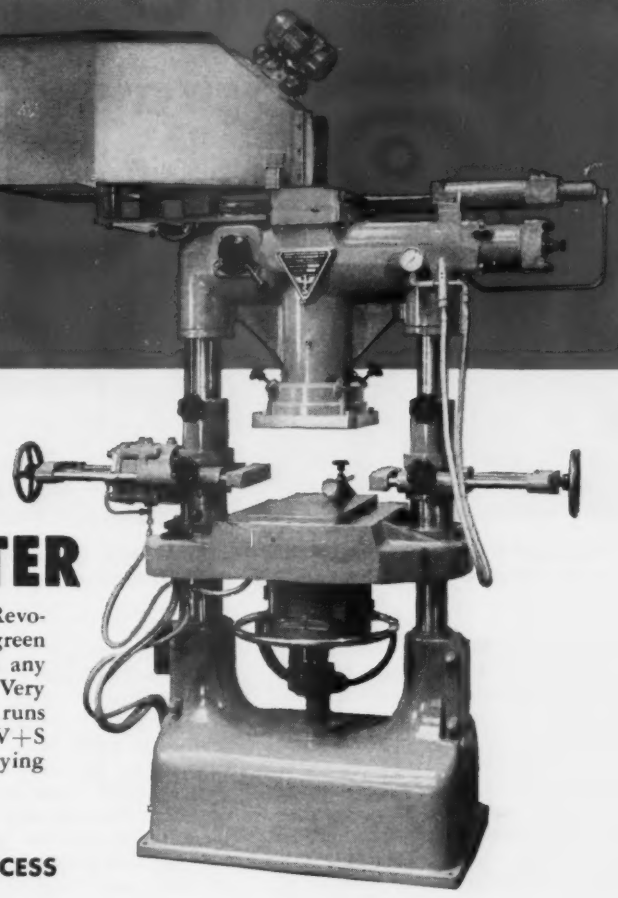
**CASTINGS CARRY THE LOAD:** Two 26-ton steel castings like this one will become the foundation pedestals for the Pittsburgh Fort Pitt bridge. Left to right, checking details of the casting before its shipment from the Coraopolis, Pa., Works of Blaw-Knox Co.'s Foundry & Mill Machinery Division, are R. J. Kadlick, chief inspector; A. B. Crawford, manager of railway sales at Blaw-Knox; and Howard Gebhart, assistant general superintendent at the Coraopolis Works

**FOUNDRYMEN VISIT STEEL PLANT:** On March 15, Great Lakes Steel Corp., Division of National Steel Corp., Ecorse, Mich., played host to members of Detroit Chapter, American Foundrymen's Society. Arrangements for the plant visit were made by Hanna Furnace Corp., merchant pig iron division of National Steel Corp. In the illustration, some of the visiting foundrymen are shown as they watch operations

**COLLEGES OF CYLINDER KNOWLEDGE:** Nine years ago, Miller Fluid Power Division of Flick-Reedy Corp., Melrose Park, Ill., put into operation its first roving "college" to educate production and maintenance engineers in the application of fluid power. Today, the project has grown to four such "colleges," each a completely equipped classroom housed in a modern, air-conditioned bus, and nearly 300,000 students have graduated from these Miller Colleges. Shown here is a field representative demonstrating how a small cylinder bends a steel bar

# For Lightning Fast Production!

## Everything you need for the $CO_2$ PROCESS



### Featuring the revolutionary...

## V+S CORE SHOOTER

*. . . the world's fastest core making machine!* Revolutionary new technique. Extremely high green strength "stand up" cores can be made with any binder • Negligible wear on wood boxes • Very little air is used • Economical for large or short runs • Core boxes can be changed in one minute • V+S Core Shooters are available in 4 sizes of varying capacities.

**Ask for HANDBOOK on the $CO_2$ PROCESS**

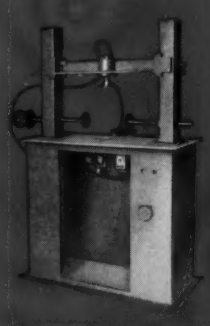
# CARVER FOUNDRY PRODUCTS

1060 HERSHEY AVE., MUSCATINE, IOWA

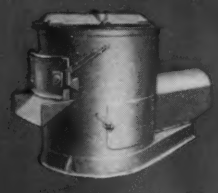
*Complete Suppliers for the* $CO_2$ PROCESS

**FORMLAC CORE and MOLD WASH**

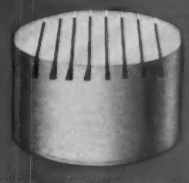
puts a hard coat on $CO_2$ cores that tremendously improves handleability. High refractory properties assure against burn-in on any size casting. Wonderful to stiffen up long, delicate or thin cores.



CARVER AUTOMATIC GASSING APPARATUS



V + S RAPID SAND MIXER



*Self-Cleaning, Taper-Slot* CORE VENTS

STEINEX

**STEINEX**

**the original $CO_2$ sand binder, is the *standard of quality and comparison* throughout the world. Hardens fast, produces harder cores, less gas evolution and better shake-out. *Made in seven grades to meet our customers' specific requirements.***

## *Multiple Booths Efficient in*

# Spray Painting Castings

Large gray iron castings, in weights up to 17 tons, are spray painted in this 20 x 20-ft spray booth in the new Bullard Co. foundry

CUSTOM-SIZED spray painting facilities are said to have resulted in increased production efficiency and reduced labor and material costs in finishing of heavy machine tools at the Bullard Co., Bridgeport, Conn. Bullard's spray finishing facilities, provided by the Binks Mfg. Co., Chicago, are tailored to the company's specific requirements. Machine tool equipment produced and finished in the plant ranges from small parts which weigh less than 1 lb to vertical turret lathes which stand 12 ft high and weigh 35 tons.

To finish this range of equipment quickly and efficiently, the company uses six different spray booths. Each is sized for its purpose, from the small-parts booth in the shipping department to the large ones used in applying finish coats to lathes after assembly. Because each booth is designed for its specific job, the company has been able to boost efficiency and cut costs through reductions in material and time.

Five of the spray booths are dry floor-type models, including one booth used in Bullard's new foundry to paint large gray iron castings; two in the machining division to paint small gray iron castings; and two in the final erecting department for the application of finish coats after the machine tools have been assembled. In addition, a dry bench-type booth is used in the company's shipping division to paint order and service parts.

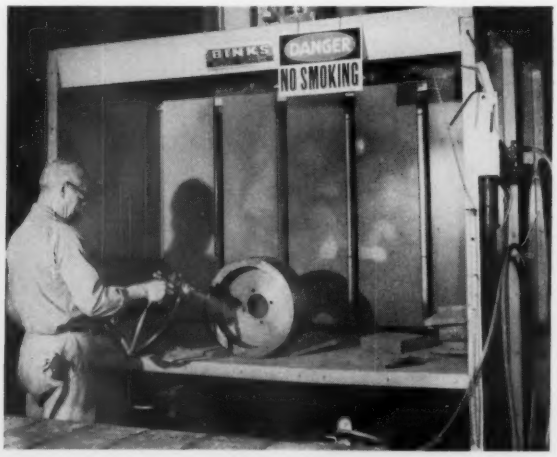
Dry-type spray booths are preferable for Bullard's finishing process because of the intermittent nature of the operation. Often the booths are not in continuous use, and dry-type booths provide exhaust facilities that can be turned on and off quickly and easily.

Spraying equipment originally was installed in the Bullard plant in 1941. Since then, paint facilities have been supplemented and modified by enlarging the booths and moving them to strategically located points. A large 20 x 20-ft booth recently was moved to the new foundry, which was completed in 1956. The new foundry is the point of origin of many of the parts used in the company's machine tools.

After the large castings are cleaned, chipped and filled, they are sent to the foundry's large booth for

Small castings are spray painted in two dry floor-type booths in the company's machining division

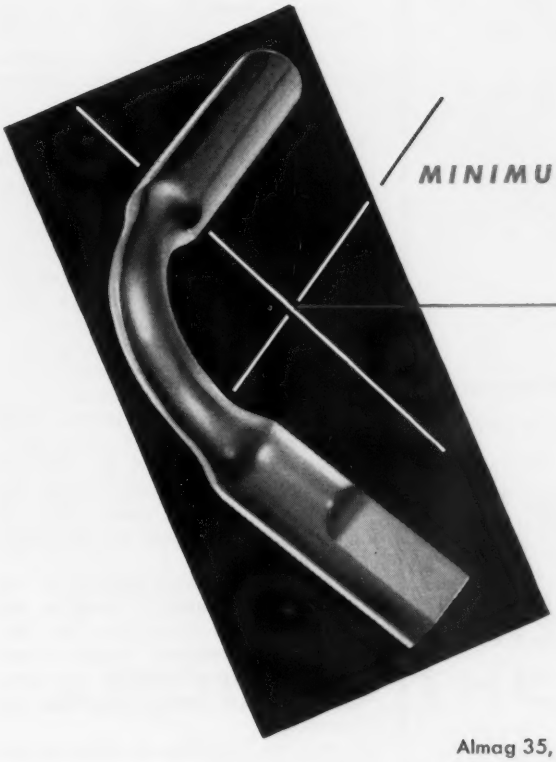
This 4-ft spray booth in the shipping department is used to spray finish separately ordered parts



**MATCHLESS QUALITY • NO PREMIUM**

# ALMAG 35

**ALUMINUM ALLOY**



***MINIMUM YIELD STRENGTH 19,000 psi.***

**with No Heat Treating — Age Hardening**

**Elongation — 13-15%**
**Charpy Impact — 10.47 ft. lbs.**
**Tensile Strength — 37,000 to 40,000 psi.**
**All Properties As-Cast**

Covered by U. S. Patents Nos. 2564044, 2628899, 2583473

Almag 35, for the first time, gives the designing engineer one aluminum alloy with all vital properties — as-cast. Almag's exclusive combination of high strength, high ductility, high shock resistance, high corrosion resistance, superior machinability, dimensional stability and stability of physical properties are instantly available with no heat-treatment or age hardening.

No other aluminum alloy offers these properties. You get them all in Almag 35 at no premium in cost.

*Before you Specify ANY ALLOY — Ask for Bulletin 350.*

## WILLIAM F. JOBBINS INCORPORATED

**P. O. BOX 230** **AURORA, ILLINOIS**

**TERRE HAUTE**
**SPECIAL FOUNDRY COKE**

*"...as you want it!"*

- Only premium grades of coking coals go into it—the best the market affords
- Full care to highest possible fixed carbon and shatter resistance. Low ash. Proper density and uniform cell structure.
- Result? You choose wisely and permanently when you specify Terre Haute special foundry coke.

SOLD EXCLUSIVELY BY

**REPUBLIC COAL & COKE CO.**
WILLOUGHBY TOWER, CHICAGO 3, ILLINOIS
Branches: Peoria • St. Louis • Indianapolis
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Manufactured by: INDIANA GAS & CHEMICAL CORP
Terre Haute, Indiana

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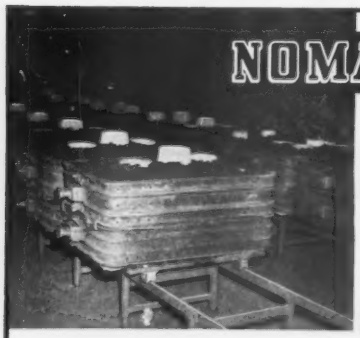
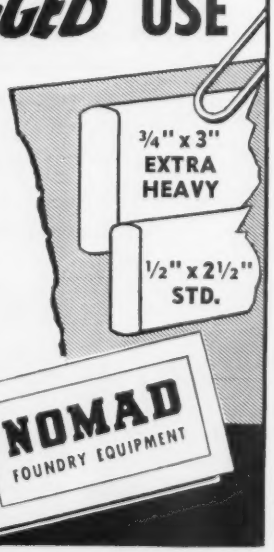


**NOMAD CONVEYOR RAILS are *EXTRA* HEAVY for *RUGGED* USE**

The progressive foundryman knows that he needs the right equipment for heavy work. Nomad's extra-heavy rail is specially designed to stand up against the tough usage of heavy foundry shops. Each conveyor is ruggedly built to accommodate large bottom board and flask equipment. The extra-heavy Nomad Conveyor Rail is *right* for big work installations.

Write for factual information regarding the equipment that is built to withstand abuse.




WESTOVER CORPORATION
NOMAD EQUIPMENT DIVISION
3110 W. FOND DU LAC AVE. • MILWAUKEE 10, WIS.

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painting. Smaller castings are shot-cleaned, ground and finished. They then are moved to the two smaller booths in the machining division.

In the spray booths, a coat of gray paint is applied to castings with Model 18 spray guns. The paint is contained in pressure tanks with air-powered paint agitators. Density and pattern of the spray are controlled easily by nozzle adjustments on the spray guns.

The two booths in the machining division utilize turntables which enable the operator to swivel the parts into position easily for fast, even paint application. In the large foundry booth, ample hose lengths and plenty of working room enable the operator to attain maximum spray efficiency and even quality in painting castings which weigh up to 17 tons.

**All Booths Have Exhaust Fans**

All of the booths are equipped with exhaust fans. Situated at the top and rear of the booths, these fans draw paint overspray out through a bank of air filters which effectively remove all paint particles. The filtered air then passes through large ducts and is exhausted outside.

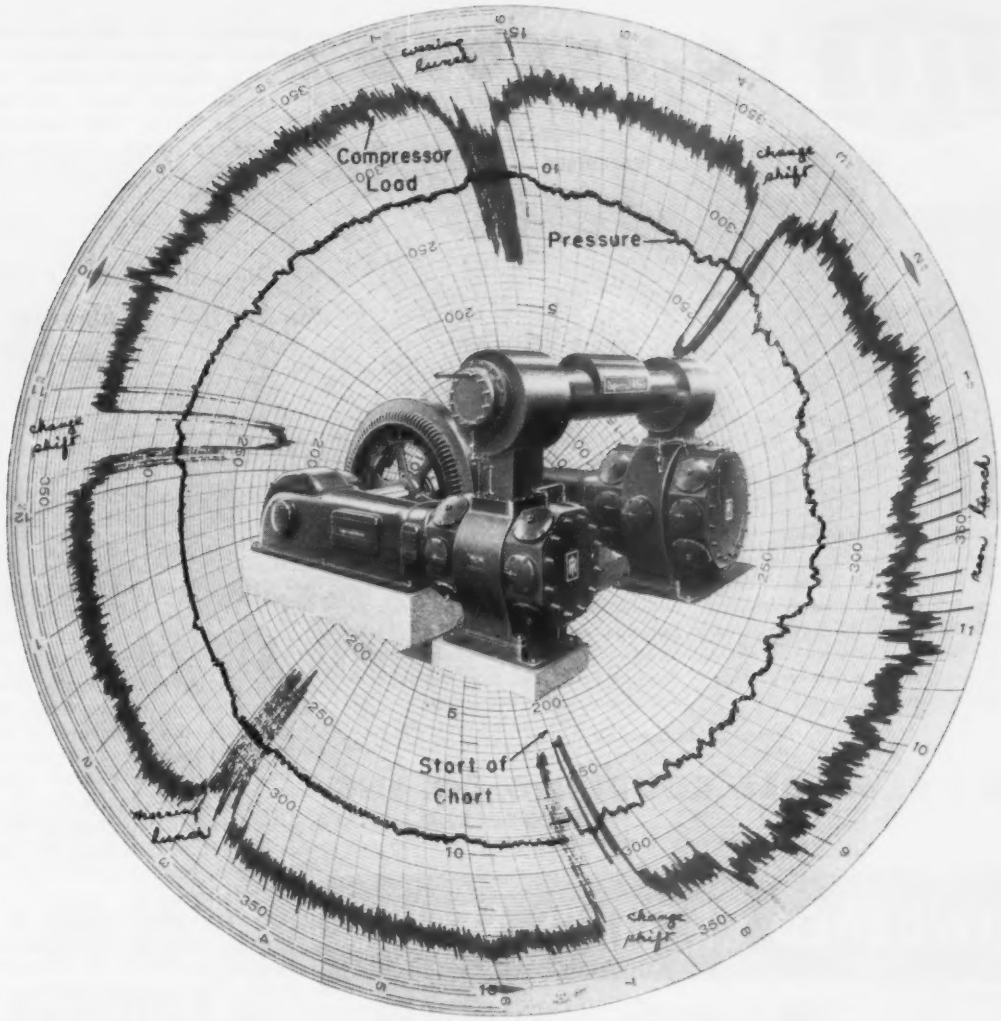
The spray painting facilities provide good working conditions for paint crews because the fans and air filters work together to remove paint particles and keep the surrounding air clean. This system benefits not only the spray operators, but also employees in nearby areas. Once-a-month cleaning keeps the air filters in top shape.

After their initial painting in the foundry, the castings move to the machine shop, where they are machined to required specifications. They then are sent to the company's final erecting department for assembly.

The final painting operation is carried out in two large 17 x 37-ft booths in the erecting shop. There the castings are refilled after assembly and given two coats of finish paint prior to shipment. These booths are large enough to accommodate two medium-sized vertical turret lathes at one time. The largest machine sprayed in the booths is a 76-in. vertical turret lathe. The company's largest production item, it weighs about 35 tons.

A crew of employees gives each machine a final thorough cleaning prior to application of the paint. The paint then is sprayed on with guns which draw the paint from large drums and pressure tanks at the sides of the booths. Large booth fans there also effectively remove all overspray.

A smaller, 4-ft dry bench-type




# AROUND THE CLOCK

## *with an Ingersoll-Rand PRE Compressor*

**Heavy 24-hour loading like this is all in a day's work at Caterpillar Tractor Co.**

An air compressor doesn't punch a time clock. But the 24-hour pressure-capacity chart shown above gives an even better record of its actual, on-the-job performance at Caterpillar Tractor Co., Peoria, Ill.

This chart was taken on a nine-year-old PRE compressor supplying 3330 cfm at 95 psi for general plant air. Except for a slight "breather" during changing of shifts, this heavy-duty compressor is called upon to deliver full rated capacity virtually 24 hours a day — month after month, year after year.

This compressor is one of eight PREs (total capacity 24,640 cfm) in round-the-clock service at the Caterpillar plant. The first PRE unit was installed here in 1927 and, like all the rest, is still giving efficient, dependable performance under full load conditions.

For proved dependability like this, in continuous heavy-duty service, it pays to specify Ingersoll-Rand compressors. Ask your I-R representative to give you the complete story.

PRE compressors, 400 to 3000 hp, use I-R Channel Valves

I-567

**Ingersoll-Rand**

11 Broadway, New York 4, N. Y.

**COMPRESSORS • GAS AND DIESEL ENGINES • ROCK DRILLS • PUMPS • TURBO-BLOWERS • AIR AND ELECTRIC TOOLS**

AJAX LO-VEYORS

FOR MULTI-PURPOSE
HANDLING AND PROCESSING
OF BULK MATERIALS

This popular type of Ajax open pan Lo-Veyor is used extensively where there are no contamination problems.

AJAX Lo-Veyors are made in lengths from 3 feet up. They are available in open pan or booted cover types to safeguard critical processes or formulas against contamination. Conveyor pans can be arranged for simultaneous screening, washing, drying, cooling and other operations. Stringy, elongated, abrasive, fine or course mesh materials never hang up while being conveyed in Ajax Vibrating Lo-Veyors. The positive upward and forward tossing action keeps materials flowing freely and evenly.

Tubular type Ajax Lo-Veyors provide sealed, gas tight operation in closed systems under vacuum or pressure. Diaphragm seals can be used where tube passes through walls of processing plants.

Ajax Vibrating Lo-Veyors are self-contained, require little head room for drive and pan, are easily and quickly installed on or below floor levels or suspended from walls or ceilings. Made in a wide range of sizes and lengths, they are being used from beginning to end in progressive processing.

*Write for Bulletin 39*

**AJAX FLEXIBLE COUPLING CO. INC.**
**WESTFIELD, N. Y.**

Circle 716 on Inquiry Card—Page 51

POWDERED CASTINGS SEALED

FLOOR SPACE
12′ by 2′ 6″

Heated by Gas, Steam or Electricity. AC or DC, 110, 220, 440, 550 Volts.

QUICKER, CLEANER
WITH
IMPREX
IMPREGNATION EQUIPMENT

Cut curing time to five minutes by treating porous powdered castings of any metal with IMPREX Low Pressure Vacuum Impregnation Equipment. Fast-action curing by the unique, new IMPREX Liquid Polymerizer creates greater retention of high-quality IMPREX plastic sealant. Result: Elimination of bleed-out and sweating means cleaner and denser powdered castings. An IMPREX custom-built unit can be installed in your plant within three weeks, increasing production of powdered parts by reducing processing and clean-up time.

IMPREX DIVISION
IDEAL INDUSTRIES, INC., SYCAMORE, ILL.
2023-D SOUTH 60th
MILWAUKEE 19, WISCONSIN

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booth in the shipping department forms a separate part of company's spray painting facilities. Operated in the same manner as the larger booths, it is used exclusively for spraying small parts ordered separately, either as new items or replacements.

## Organize Society for Makers And Users of Abrasives

A nationwide, nonprofit technical and study organization named American Society for Abrasives has been formed by a group of men interested in many different facets of the abrasives field. A long-range objective of the society is the establishment of uniform standards for abrasives and abrasive products.

Plans of the society call for organization throughout the country of chapters to hold meetings for technical discussions of all phases of the use, manufacture and improvement of abrasives, to create good fellowship among the members and to facilitate the exchange of knowledge gained from practical experience.

Chapters have been organized in New England, the Middle Atlantic States and Michigan. Steps also are being taken to organize local chapters in various other areas, including California.

At a recent meeting in Philadelphia, the following national officers were elected: T. J. O'Connell, Macklin Co., Jackson, Mich., chairman; John Y. Arnold, Carpenter Steel Co., Reading, Pa., president; Ray B. Rider, General Electric Co., Lynn, Mass., vice president; Jan L. Deelman, Reading, Pa., secretary; and Willard Miller, Mt. Penn Trust Co., Reading, treasurer. Directors include Howard Swatkins, Pratt & Whitney, North Haven, Conn.; James G. Bair, Fox Grinders, Pittsburgh; and Frank Blaine, Maurice Dessau Co., New York.

All the officers are active in the use or manufacture of abrasives except the secretary, an attorney, and the treasurer.

The three classes of membership in the society are student (under 21), senior (21 and over) and associate (corporations and companies). Dues are, respectively, $5, $10 and $100. For a limited time, those who apply for membership and are admitted will be charter members.

Information concerning the society and membership application blanks may be obtained from Jan L. Deelman, secretary, American Society for Abrasives, 222 Berks County Trust Building, Reading, Pa.

Core making at Aluminum Casting and Engineering Company is as well laid out as the most modern, step-saver kitchen. The worker is never more than one or two steps from the core shooter that fills the core box, to the $CO_2$ tank and gas injector, to the work area where the cured core is removed.

This close-up of the $CO_2$ tank and gas injector reveals the simplicity of the operation. By the time the worker has removed the core box from the gas injector and placed it on the work area, the core is cured and ready for removal.

# Intricate Aluminum Casting Cores

## CURED IN 15 SECONDS!

Aluminum Casting and Engineering Company of Milwaukee is one of the pioneer firms in fabricating parts of lightweight aluminum.

They manufacture a particularly intricate aluminum casting for the upper gear housing of one of America's most popular 25 h. p. outboard motors. This casting is made by using a permanent mold and a $CO_2$ set sand core. Before they began making this casting, the core was formed of four separate sections and then pieced together.

### $CO_2$ MAKES A ONE-PIECE CORE POSSIBLE

Now, with the $CO_2$ set process, the core is made in one piece and cures in 15 seconds, without baking or drying. Core making with any other method would be virtually impossible because the intricate nature of the core requires great strength and complete curing *before* handling. Aluminum Casting and Engineering Company reports that they can control the strength of the cured core by the amount of $CO_2$ set binder mixed with the sand . . . an important control factor.

The $CO_2$ set core has a high quality finish when removed from the core box. This greatly cuts down the amount of hand labor required to clean-up and finish the cured core. Because the sand is extruded into the core box, there is no abrasive action and wear. This allows use of a lightweight core box made of aluminum.

$CO_2$ set can be used to cure sand molds and cores for every type of ferrous or non-ferrous casting. We will be glad to show you how your time and dollar investment in molds and cores can be greatly reduced. Mail the coupon for full particulars.

*World's Largest Producer of*

THE LIQUID CARBONIC CORPORATION

Chicago 23, Illinois

Here is the rough casting and the sand core side by side. Because of its dimensional stability, the $CO_2$ set core contributes greatly to the high quality of the aluminum casting.

**THE LIQUID CARBONIC CORPORATION**
3150 South Kedzie Avenue • Chicago 23, Illinois

Please send me complete information on $CO_2$ set for curing sand molds and cores.

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

SHAKE-OUT VIBRATORS
for all foundry applications

Write for complete specifications and prices.
AIR OR ELECTRIC
PORTABLE OR PERMANENT
SILENT OR STANDARD

Bin Stuck Lately?
THE CLEVELAND VIBRATOR COMPANY
2788 Clinton Avenue • Cleveland 13, Ohio

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# Obituary

**WILLIAM A. KENNEDY,** supervisor of products, Grinnell Corp., Providence, R. I., died Apr. 8. His long service to the malleable castings industry was evidenced by active participation in committee work of various technical societies. Mr. Kennedy served as chairman of Committee A-7 on Malleable Iron Castings of the American Society for Testing Materials, and was a member of the Research Committee of

WILLIAM A. KENNEDY

the Malleable Division, American Foundrymen's Society. He was a member of the Handbook Committee and chairman of the Technical Council of the Malleable Founders' Society for many years, and in 1955 was awarded the McCrea Medal of the society for outstanding service to the malleable industry.

**J. Martin Duncan,** 69, president of the former Detroit Steel Casting Co., Detroit, died May 3. Mr. Duncan was associated with the company for more than 40 years, when illness forced his retirement about 9 years ago. Active in the National Foundry Association, Mr. Duncan had served as a member of its Administrative Council.

**John F. Mooney,** 33, vice president and chief design engineer, Star Foundry & Machine Co., New Lexington, O., died April 6. Mr. Mooney was associated with his father and brothers in the company.

**James J. McLaughlin,** 70, formerly general manager, Savannah Machine & Foundry Co., Savannah, Ga., died April 5. Mr. McLaughlin was general manager McLaughlin Iron Works, Charleston, S. C., from 1920 to 1925, when he became associated with Forest City Machine & Foundry Co., predecessor of Savannah Machine & Foundry Co. He was active until 1953.

**R. Lynn Ogden,** 63, for many years active in the foundry industry, died Apr. 15, in Atlanta. For 34 years Mr. Ogden was associated with Stockham Pipe Fittings Co., Birmingham, progressing from coreroom foreman to general superintendent. In 1943 he resigned to organize the Ogden Foundry Co., Birmingham, and later joined Jackson Industries Inc., there, as plant manager. After that he was associated with National Foundry Co. of New York Inc., and was senior engineer, Lester B. Knight & Associates, Chicago. Mr. Ogden was active in the Birmingham Chapter of the AFS, serving as vice chairman and on numerous committees. He retired several years ago.

**Andrew M. Ondreyco,** until recently associated with the Metals Division, General Metals Corp., Oakland, Calif., which he joined in 1952, died Apr. 15. He resigned a short time ago to open his own foundry. Previous affiliations include Meehanite Metal Corp., Pittsburgh, as foundry engineer and metallurgist, assistant foundry superintendent, Cooper-Bessemer Corp., Grove City, Pa., and plant manager, Vulcan Foundry Co., Oakland, Calif. He was a former president of Northern California Chapter of the AFS and a national director of AFS in 1952.

**Frank Weir,** 57, assistant general sales manager, Harbison-Walker Refractories Co., Pittsburgh, died Apr. 23. Mr. Weir joined the company in 1923, and after serving as sales representative in New York, Boston and Buffalo, was district sales manager in St. Louis and Pittsburgh.

**John Livingston,** assistant plant engineer, Crouse-Hinds Co., Syracuse, N. Y., died recently. Active in the National Foundry Association, Mr. Livingston was a member of its Administrative Council from 1950 to 1955.

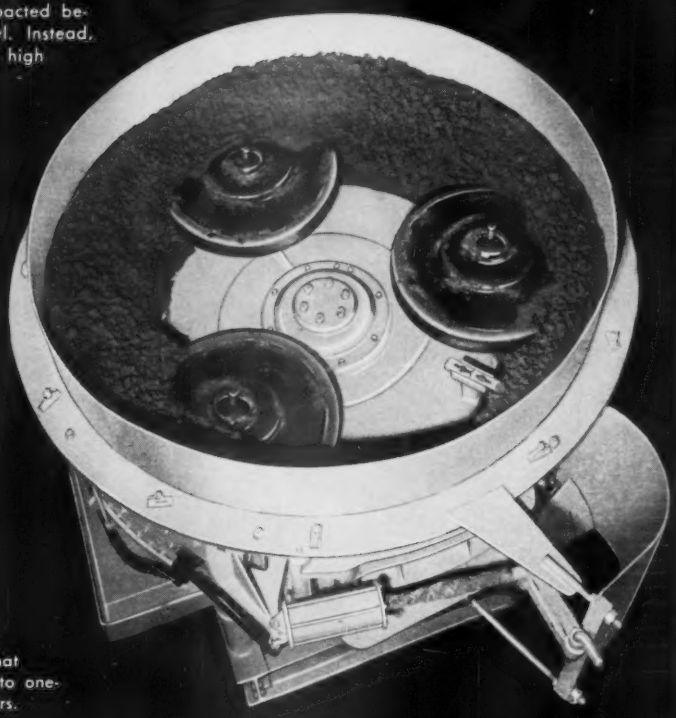
**Henry E. Bromer,** resident manager, Decatur Casting Co., Decatur, Ind., died Apr. 26.

**Milton W. Reinhart,** 56, sales manager, American Aluminum Casting Co., Irvington, N. J., died April 10.

# Why buy a mullor that won't aerate?

## *only* the **SPEEDMULLOR** aerates as it mulls!

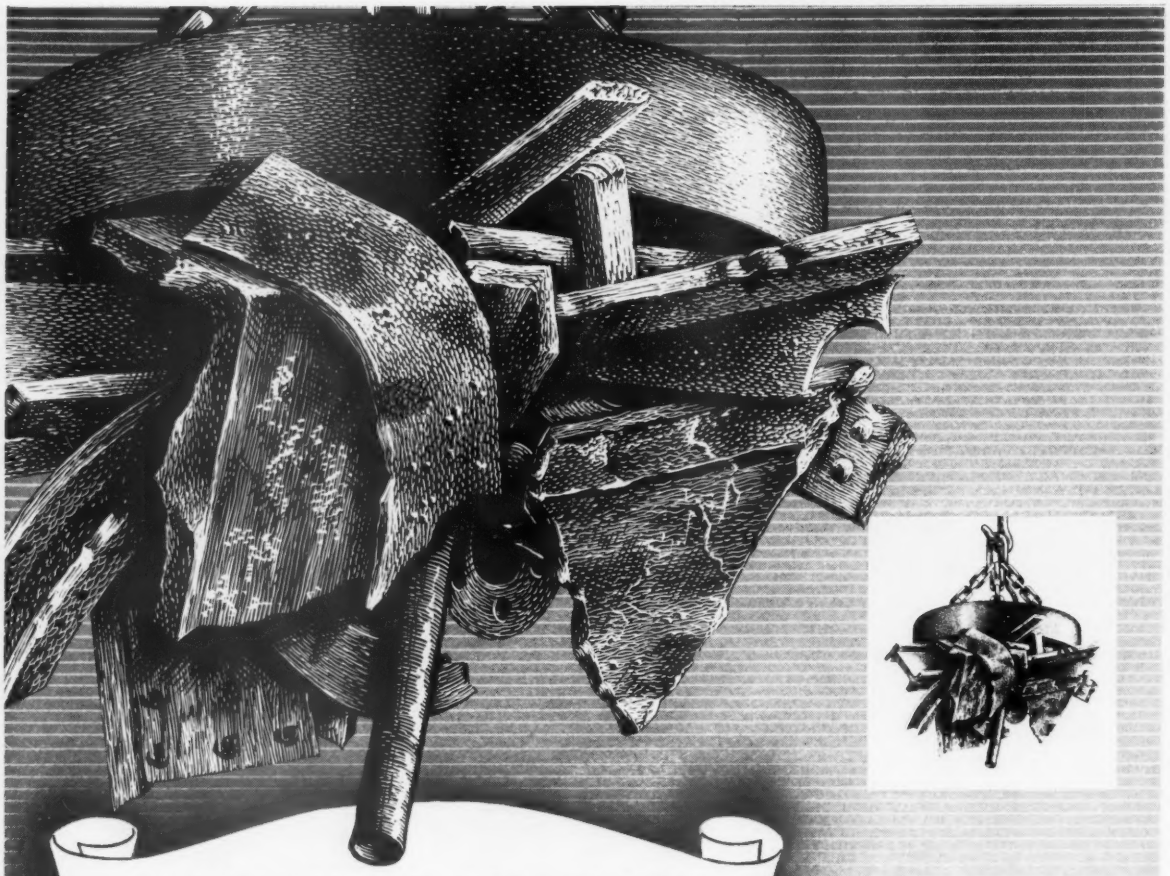
- In the Speedmullor, the sand is not compacted between heavy steel wheels and steel bowl. Instead, sand is fluffed and aerated *as it is mulled* high on the side of the rubber lined bowl.
- Sand is mulled between rubber tired wheels and rubber lined bowl . . . no sand grain crushing . . . perfect squeezing and kneading mulling action. Another Speedmullor exclusive.
- Precise control of mulling pressure through scientifically applied centrifugal force — no dependence on hard-to-adjust springs where as little as ¼-inch misadjustment will mean an 800 pound pressure error.
- Highest hourly capacity with far higher production per mullor dollar, yet smaller batches that can be handled by far less costly hoppers, conveyors, elevators, etc.
- Need cooling? Only the Speedmullor provides modern *through-the-batch* air cooling . . . doesn't merely blow air over the hot sand mass.
- Fast discharge required? The Speedmullor's centrifugal mulling and side discharge mean that discharge can be accomplished in one-third to one-fifth the time required by old style mixers.



### HOURLY CAPACITY — FULLY MULLED AND AERATED SAND

| Speedmullor Model | Hourly capacity of typical system sands not requiring cooling | Hourly capacity of typical core sands, facing sands, or hot system sands requiring cooling |
|---|---|---|
| **Model 80A** | 76 tons per hour | 38 tons per hour |
| **Model 70A** | 58 tons per hour | 29 tons per hour |
| **Model 60A** | 38 tons per hour | 19 tons per hour |
| **Model 50A** | 29 tons per hour | 14½ tons per hour |
| **Model 40A** | 19 tons per hour | 9½ tons per hour |
| **Model 30A** | 13 tons per hour | 6½ tons per hour |

Write now for Bulletin No. 1220.
Beardsley & Piper Div. Pettibone Mulliken Corp.,
2424 N. Cicero Avenue, Chicago 39, Illinois.



# A SYMBOL OF LEADERSHIP IN IRON & STEEL SCRAP SINCE 1889

## *Luria Brothers and Company, Inc.*

MAIN OFFICE

**PHILADELPHIA NATIONAL BANK BLDG.**

Philadelphia 7, Penna.

PLANTS

LEBANON, PENNA. — READING, PENNA. — MODENA, PENNA. — ERIE, PENNA. — DETROIT (ECORSE), MICHIGAN — PITTSBURGH, PENNA.

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EXPORTS-IMPORTS **LIVINGSTON & SOUTHARD, INC.** 99 Park Ave., New York, N. Y. *Cable Address:* **FORENTRACO**

# Foundry Statistics

## ALUMINUM

(Shipments of castings—1000 pounds[1])

| | Shipments | | | | Unfilled Orders[2] |
|---|---|---|---|---|---|
| | Total | Sand | Perm. Mold | Die | |
| 1955 | 827,162 | 165,482 | 298,349 | 355,203 | ..... |
| 1956 | | | | | |
| Feb. | 73,096 | 15,560 | 23,963 | 32,949 | 115,958 |
| 2 mo. | 147,248 | 31,421 | 48,491 | 66,202 | ..... |
| Mar. | 73,785 | 16,597 | 22,816 | 33,965 | 110,642 |
| Apr. | 67,880 | 14,732 | 20,718 | 31,782 | 106,477 |
| May | 65,786 | 15,570 | 19,699 | 29,814 | 102,121 |
| June | 58,189 | 13,448 | 19,067 | 25,027 | 102,068 |
| July | 52,955 | 12,398 | 16,388 | 23,491 | 106,620 |
| Aug. | 61,407 | 13,100 | 18,067 | 29,553 | 109,352 |
| Sept. | 62,503 | 12,354 | 17,855 | 31,640 | 111,785 |
| Oct. | 74,209 | 14,389 | 21,120 | 37,782 | 110,818 |
| Nov. | 69,741 | 14,333 | 20,673 | 33,929 | 113,356 |
| Dec. | 67,333 | 13,391 | 20,557 | 32,931 | 118,185 |
| Total | 801,036 | 171,733 | 245,451 | 376,116 | ..... |
| 1957 | | | | | |
| Jan. | 72,999 | 14,201 | 20,963 | 37,194 | 116,088 |
| Feb. | 69,727 | 13,366 | 21,707 | 34,311 | 107,869 |
| 2 mo. | 142,726 | 27,567 | 42,670 | 71,505 | ..... |

## MALLEABLE IRON

(Shipments of castings—net tons[1])

| | Shipments | | Standard | | Pearlitic | | Unfilled Orders[2] |
|---|---|---|---|---|---|---|---|
| | Total | For Sale | Total | For Sale | Total | For Sale | |
| 1955 | 1,104,775 | 652,552 | ..... | ..... | ..... | ..... | ..... |
| 1956 | | | | | | | |
| Feb. | 93,533 | 54,466 | 80,601 | 47,606 | 12,932 | 6,860 | 113,616 |
| 2 mo. | 187,095 | 109,084 | 160,007 | 93,353 | 27,088 | 15,731 | ..... |
| Mar. | 86,941 | 46,266 | 75,384 | 40,869 | 11,557 | 5,397 | 106,491 |
| Apr. | 83,320 | 47,064 | 72,763 | 41,449 | 10,557 | 5,615 | 99,573 |
| May | 80,138 | 51,053 | 69,593 | 44,424 | 10,545 | 6,629 | 93,677 |
| June | 75,635 | 45,022 | 66,300 | 26,791 | 9,335 | 5,513 | 86,247 |
| July | 54,340 | 31,300 | 45,977 | 26,881 | 8,363 | 4,419 | 92,078 |
| Aug. | 74,422 | 43,479 | 62,867 | 36,759 | 11,555 | 6,720 | 91,883 |
| Sept. | 69,380 | 41,902 | 59,071 | 35,534 | 10,309 | 6,368 | 92,553 |
| Oct. | 81,528 | 50,219 | 68,769 | 43,109 | 12,759 | 7,110 | 92,734 |
| Nov. | 82,717 | 47,979 | 68,549 | 40,107 | 14,168 | 7,872 | 89,977 |
| Dec. | 76,352 | 44,268 | 63,625 | 37,569 | 12,727 | 6,699 | 92,311 |
| Total | 951,868 | 557,636 | 812,905 | 466,845 | 138,963 | 78,073 | ..... |
| 1957 | | | | | | | |
| Jan. | 85,977 | 51,508 | 71,689 | 43,401 | 14,288 | 8,107 | 93,886 |
| Feb. | 78,028 | 46,729 | 65,411 | 39,590 | 12,617 | 7,139 | 90,725 |
| 2 mo. | 164,005 | 98,237 | 137,100 | 82,991 | 26,905 | 15,246 | ..... |

## COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

| | Shipments | | | Unfilled Orders[2] |
|---|---|---|---|---|
| | Total | Sand | Perm. Mold | |
| 1955 | 1,008,898 | 905,867 | 63,111 | ..... |
| 1956 | | | | |
| Feb. | 91,706 | 82,244 | 5,888 | 57,515 |
| 2 mo. | 181,473 | 162,360 | 12,023 | ..... |
| Mar. | 96,085 | 85,094 | 6,299 | 65,560 |
| Apr. | 90,679 | 81,333 | 5,835 | 68,106 |
| May | 89,188 | 80,105 | 5,448 | 58,789 |
| June | 78,921 | 70,260 | 5,052 | 55,019 |
| July | 60,926 | 55,027 | 3,193 | 59,661 |
| Aug. | 77,619 | 70,479 | 3,805 | 56,364 |
| Sept. | 72,109 | 64,887 | 3,930 | 56,990 |
| Oct. | 81,049 | 73,058 | 4,104 | 54,363 |
| Nov. | 72,866 | 65,022 | 4,114 | 52,643 |
| Dec. | 65,198 | 57,929 | 3,769 | 56,556 |
| Total | 966,113 | 865,554 | 57,572 | ..... |
| 1957 | | | | |
| Jan. | 82,025 | 73,202 | 4,510 | 57,422 |
| Feb. | 72,084 | 64,346 | 4,188 | 54,133 |
| 2 mo. | 154,109 | 137,548 | 8,698 | ..... |

## MAGNESIUM

(Shipments of castings—1000 pounds[1])

| | Shipments | | Unfilled Orders[2] |
|---|---|---|---|
| | Total | For Sale | |
| 1955 | 27,854 | 25,294 | .... |
| 1956 | | | |
| Feb. | 2,977 | 2,720 | 6,704 |
| 2 mo. | 5,936 | 5,320 | .... |
| Mar. | 3,046 | 2,842 | 6,414 |
| Apr. | 3,140 | 2,949 | 7,137 |
| May | 3,021 | 2,801 | 7,293 |
| June | 2,949 | 2,765 | 7,850 |
| July | 2,810 | 2,666 | 7,937 |
| Aug. | 3,059 | 2,860 | 8,201 |
| Sept. | 3,079 | 2,863 | 8,193 |
| Oct. | 3,442 | 3,187 | 7,893 |
| Nov. | 2,892 | 2,715 | 7,984 |
| Dec. | 2,794 | 2,612 | 7,616 |
| Total | 36,168 | 33,580 | .... |
| 1957 | | | |
| Jan. | 3,207 | 3,017 | 8,245 |
| Feb. | 2,661 | 2,473 | 8,276 |
| 2 mo. | 5,868 | 5,490 | .... |

## PRODUCTION WORKERS

### Estimated Number

| | Jan. 1957 | Dec. 1956 | Jan. 1956 |
|---|---|---|---|
| Ferrous | 205,800 | 206,600 | 216,600 |
| Nonferrous | 67,300 | 67,000 | 67,800 |

### Average Weekly Earnings

| | | | |
|---|---|---|---|
| Gray Iron | 84.99 | 88.80 | 83.23 |
| Malleable Iron | 86.24 | 86.07 | 86.32 |
| Steel | 97.94 | 99.10 | 95.04 |
| Nonferrous | 91.13 | 94.02 | 85.84 |

### Average Weekly Hours

| | | | |
|---|---|---|---|
| Gray Iron | 39.9 | 41.3 | 40.8 |
| Malleable Iron | 40.3 | 40.6 | 41.7 |
| Steel | 42.4 | 42.9 | 43.2 |
| Nonferrous | 40.5 | 41.6 | 40.3 |

Source: Bureau of Labor Statistics

## GRAY IRON CASTINGS—SHIPMENTS

(Net Tons[1])

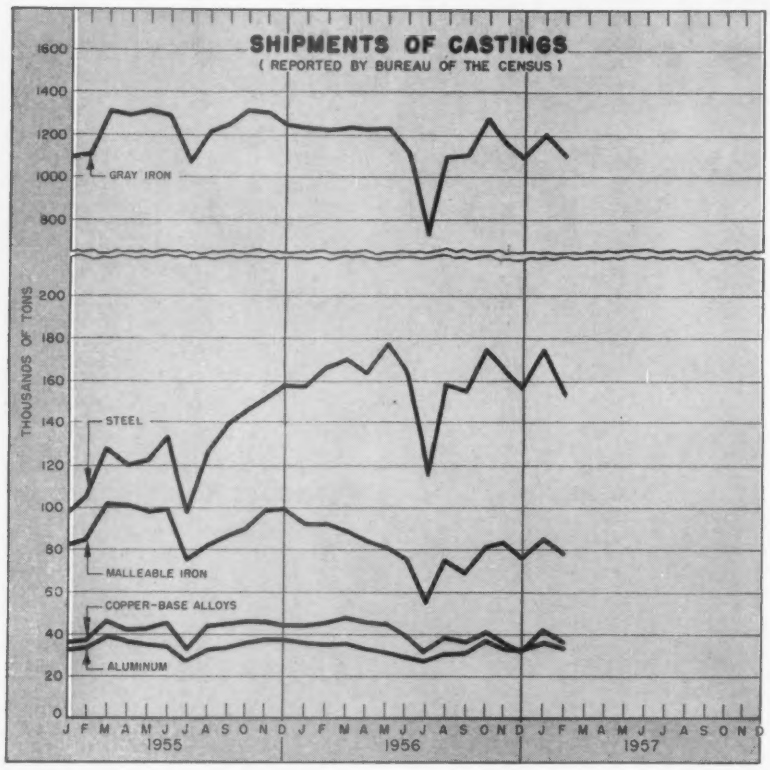
| | All Castings | | Miscellaneous Castings | | Heavy Steel Ingot Molds | | Chilled Railroad Car Wheels | Pressure Pipe & Fittings | Soil Pipe & Fittings | Unfilled Orders[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | For Sale | Total | For Sale | Total | For Sale | Total | Total[3] | Total[3] | |
| 1955 | 14,837,745 | 7,987,205 | 9,161,685 | 3,715,963 | 2,739,864 | 1,392,209 | 385,041 | 1,681,630 | 869,558 | ..... |
| 1956 | | | | | | | | | | |
| Feb. | 1,214,769 | 680,494 | 739,786 | 322,956 | 242,207 | 128,643 | 35,074 | 133,254 | 64,448 | 1,140,765 |
| 2 mo. | 2,464,287 | 1,357,511 | 1,509,612 | 649,225 | 499,357 | 261,224 | 67,482 | 264,600 | 123,236 | ..... |
| Mar. | 1,255,405 | 715,173 | 752,498 | 331,749 | 254,045 | 139,625 | 42,676 | 132,384 | 73,802 | 1,162,578 |
| Apr. | 1,218,000 | 702,145 | 719,109 | 314,968 | 237,486 | 130,473 | 39,325 | 151,670 | 70,410 | 1,144,870 |
| May | 1,235,631 | 737,081 | 702,834 | 321,413 | 243,719 | 131,294 | 38,419 | 171,859 | 78,800 | 1,086,122 |
| June | 1,152,156 | 686,896 | 656,778 | 298,578 | 217,135 | 102,405 | 34,028 | 170,122 | 74,093 | 1,041,315 |
| July | 762,611 | 487,736 | 509,702 | 241,771 | 9,556 | 7,003 | 32,484 | 144,964 | 65,905 | 1,109,069 |
| Aug. | 1,103,195 | 671,523 | 639,953 | 293,673 | 170,857 | 89,589 | 31,712 | 180,249 | 80,424 | 1,074,461 |
| Sept. | 1,109,943 | 648,784 | 623,743 | 282,824 | 233,823 | 117,708 | 35,361 | 151,081 | 65,935 | 1,037,283 |
| Oct. | 1,274,734 | 734,384 | 749,200 | 331,069 | 252,203 | 134,265 | 30,978 | 171,377 | 70,976 | 996,351 |
| Nov. | 1,175,572 | 634,856 | 720,263 | 303,938 | 251,262 | 131,321 | 27,852 | 116,157 | 60,038 | 916,723 |
| Dec. | 1,108,993 | 587,046 | 681,834 | 281,527 | 254,703 | 136,584 | 25,874 | 92,439 | 54,143 | 920,034 |
| Total | 13,860,527 | 7,963,135 | 8,265,526 | 3,650,735 | 2,624,146 | 1,381,490 | 406,191 | 1,746,902 | 817,762 | ..... |
| 1957 | | | | | | | | | | |
| Jan. | 1,213,215 | 642,317 | 761,697 | 320,058 | 261,961 | 136,456 | 31,139 | 101,069 | 57,346 | 904,860 |
| Feb. | 1,103,118 | 582,010 | 705,585 | 302,514 | 230,126 | 115,525 | 30,079 | 89,146 | 48,182 | 931,054 |
| 2 mo. | 2,316,333 | 1,224,327 | 1,467,282 | 622,572 | 492,087 | 251,981 | 61,218 | 190,215 | 105,528 | ..... |

## STEEL CASTINGS—SHIPMENTS

(Net Tons[1])

| | All Castings | | | Carbon | | | Alloy | | | Unfilled Orders[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | For Sale | Railway Specialties | Total | For Sale | Railway Specialties | Total | For Sale | Railway Specialties | |
| 1955 | 1,530,694 | 1,166,706 | 236,880 | 1,088,489 | 814,258 | 219,602 | 445,769 | 354,452 | 17,278 | ..... |
| 1956 | | | | | | | | | | |
| Feb. | 165,398 | 128,598 | 30,833 | 123,279 | 94,998 | 29,112 | 42,119 | 33,600 | 1,721 | 567,330 |
| 2 mo. | 324,016 | 251,941 | 58,787 | 239,371 | 183,478 | 55,474 | 84,645 | 68,463 | 3,313 | ..... |
| Mar. | 170,045 | 130,839 | 31,991 | 126,583 | 95,779 | 29,953 | 43,462 | 35,060 | 2,038 | 594,990 |
| Apr. | 163,708 | 125,015 | 27,475 | 121,723 | 91,332 | 25,302 | 41,985 | 33,683 | 2,173 | 600,242 |
| May | 178,227 | 142,025 | 35,949 | 134,919 | 107,575 | 33,695 | 43,308 | 34,450 | 2,254 | 608,275 |
| June | 164,661 | 129,147 | 31,296 | 122,483 | 95,621 | 28,801 | 42,178 | 33,526 | 2,495 | 597,103 |
| July | 117,984 | 96,350 | 19,833 | 88,971 | 72,837 | 18,545 | 29,013 | 23,513 | 1,288 | 611,233 |
| Aug. | 159,831 | 127,001 | 32,965 | 119,025 | 94,257 | 30,601 | 40,806 | 32,744 | 2,364 | 586,496 |
| Sept. | 155,046 | 121,705 | 33,496 | 116,905 | 91,266 | 31,314 | 38,141 | 30,439 | 2,182 | 562,937 |
| Oct. | 175,630 | 135,798 | 34,762 | 132,250 | 101,961 | 32,743 | 43,380 | 33,837 | 2,019 | 558,478 |
| Nov. | 164,114 | 126,900 | 28,284 | 122,212 | 93,262 | 26,436 | 41,902 | 33,638 | 1,848 | 545,862 |
| Dec. | 158,725 | 125,569 | 34,080 | 120,326 | 94,741 | 32,227 | 38,399 | 30,828 | 1,853 | 521,782 |
| Total | 1,931,987 | 1,512,290 | 368,918 | 1,444,768 | 1,122,109 | 345,091 | 487,219 | 390,181 | 23,827 | ..... |
| 1957 | | | | | | | | | | |
| Jan. | 169,240 | 133,826 | 30,090 | 125,389 | 98,533 | 27,739 | 43,851 | 35,293 | 2,351 | 519,575 |
| Feb. | 154,932 | 121,667 | 27,181 | 114,805 | 89,480 | 25,060 | 40,127 | 32,187 | 2,121 | 511,806 |
| 2 mo. | 324,172 | 255,493 | 57,271 | 240,194 | 188,013 | 52,799 | 83,978 | 67,480 | 4,472 | ..... |

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.




## COKE PRODUCTION AND CONSUMPTION

(Net tons*)

| | Production | Consumption Total | Consumption By Foundries |
|---|---|---|---|
| 1955 | 75,150,247 | 76,266,385 | 3,154,052 |
| 1956 | | | |
| Feb. | 6,476,135 | 6,506,044 | 260,949 |
| 2 mo. | 13,390,971 | 12,688,748 | 536,609 |
| Mar. | 6,896,593 | 6,861,698 | 267,414 |
| Apr. | 6,633,363 | 6,572,836 | 247,664 |
| May | 6,725,396 | 6,587,030 | 241,558 |
| June | 6,235,691 | 6,163,668 | 214,484 |
| July | 2,301,442 | 1,596,570 | 193,431 |
| Aug. | 5,614,997 | 5,281,627 | 225,978 |
| Sept. | 6,453,229 | 6,609,309 | 211,015 |
| Oct. | 6,742,483 | 6,951,386 | 253,147 |
| Nov. | 6,328,272 | 6,681,074 | 237,330 |
| Dec. | 6,615,935 | 6,959,900 | 224,452 |
| Total | 73,938,372 | 72,953,846 | 2,853,082 |
| 1957 | | | |
| Jan. | 6,857,640 | 7,096,024 | 241,014 |
| Feb. | 6,211,653 | 6,298,909 | 225,448 |
| 2 mo. | 13,069,293 | 13,394,933 | 466,462 |

## INGOT BRASS AND BRONZE

(Shipments in net tons)

| | 1956 | 1957 |
|---|---|---|
| Jan. | 27,736 | 25,681 |
| Feb. | 24,949 | 20,769 |
| Mar. | 28,310 | 21,948 |
| Apr. | 25,808 | ..... |
| May | 23,437 | ..... |
| June | 18,842 | ..... |
| July | 17,364 | ..... |
| Aug. | 23,812 | ..... |
| Sept. | 20,929 | ..... |
| Oct. | 23,045 | ..... |
| Nov. | 21,818 | ..... |
| Dec. | 18,046 | ..... |
| Total for year | 274,096 | ..... |

Source: Defense Council of the Ingot Brass and Bronze Industry.

## ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

| | Shipments Total | Shipments For Sale | Unfilled Orders[2] |
|---|---|---|---|
| 1955 | 778,000 | 493,244 | ..... |
| 1956 | | | |
| Feb. | 66,854 | 42,300 | 76,283 |
| 2 mo. | 134,904 | 86,050 | ..... |
| Mar. | 65,760 | 42,806 | 73,025 |
| Apr. | 58,274 | 37,518 | 71,730 |
| May | 52,205 | 33,920 | 60,634 |
| June | 47,775 | 31,983 | 61,809 |
| July | 42,227 | 27,301 | 64,806 |
| Aug. | 52,321 | 33,281 | 73,411 |
| Sept. | 46,340 | 33,967 | 79,390 |
| Oct. | 65,450 | 41,943 | 75,706 |
| Nov. | 64,972 | 39,718 | 74,623 |
| Dec. | 58,111 | 36,090 | 75,293 |
| Total | 688,339 | 444,577 | ..... |
| 1957 | | | |
| Jan. | 67,964 | 42,189 | 75,503 |
| Feb. | 59,793 | 36,580 | 74,739 |
| 2 mo. | 127,757 | 78,769 | ..... |

## INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

| | 1956 | 1957 |
|---|---|---|
| Jan. | 195.6 | 117.9 |
| Feb. | 169.0 | 188.4 |
| Mar. | 152.7 | .... |
| Apr. | 135.2 | .... |
| May | 207.0 | .... |
| June | 156.7 | .... |
| July | 110.3 | .... |
| Aug. | 188.3 | .... |
| Sept. | 114.7 | .... |
| Oct. | 122.2 | .... |
| Nov. | 121.0 | .... |
| Dec. | 115.6 | .... |

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average. This is a new base period. Source: Foundry Equipment Manufacturers Association.

## IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

| | All Scrap Total | By Types of Furnace: Cupola Total | Air Total | Electric Total |
|---|---|---|---|---|
| 1954 | 54,780,758 | 8,542,581 | 855,207 | 6,100,444 |
| 1955 | | | | |
| Dec. | 6,496,796 | 910,675 | 115,436 | 830,404 |
| Total | 72,654,925 | 10,786,957 | 1,273,470 | 8,757,593 |
| 1956 | | | | |
| Jan. | 6,688,977 | 909,201 | 114,378 | 880,980 |
| Feb. | 6,345,421 | 892,373 | 116,418 | 833,661 |
| Mar. | 6,733,076 | 923,912 | 101,087 | 863,950 |
| Apr. | 6,490,680 | 862,233 | 96,514 | 842,216 |
| May | 6,491,567 | 855,007 | 104,485 | 899,967 |
| June | 5,994,989 | 776,299 | 87,525 | 831,456 |
| July | 1,986,613 | 621,064 | 56,071 | 399,441 |
| Aug. | 5,453,927 | 803,123 | 92,200 | 807,131 |
| Sept. | 6,231,017 | 738,824 | 84,627 | 841,783 |
| Oct. | 6,722,320 | 890,389 | 101,773 | 935,008 |
| Nov. | 6,305,947 | 822,542 | 95,890 | 875,524 |
| Dec. | 6,264,955 | 722,320 | 82,160 | 851,770 |
| Total | 71,709,489 | 9,817,287 | 1,133,128 | 9,862,887 |

## PIG IRON PRODUCTION AND CONSUMPTION

| | Production** (Standard grades—net tons) Total | Foundry | Malleable & Silvery | Basic | Low Phos. Intermediate Low Phos. & Bessemer | Consumption* (By type of furnace—gross tons) Total | Cupola | Air | Electric |
|---|---|---|---|---|---|---|---|---|---|
| 1955 | 77,114,073 | 2,858,957 | 3,884,971 | 62,570,394 | 7,799,751 | 68,944,698 | 5,326,534 | 260,008 | 246,406 |
| 1956 | | | | | | | | | |
| Mar. | 7,083,877 | 196,533 | 352,856 | 5,843,852 | 690,636 | 6,316,836 | 427,177 | 23,737 | 18,725 |
| 3 mo. | 20,609,021 | 636,728 | 1,040,340 | 17,000,642 | 1,931,311 | 18,463,884 | 1,299,603 | 72,106 | 43,501 |
| Apr. | 6,860,833 | 210,319 | 333,660 | 5,623,647 | 693,207 | 6,077,074 | 413,537 | 22,757 | 17,179 |
| May | 6,873,102 | 232,375 | 329,750 | 5,625,067 | 685,910 | 6,064,632 | 413,494 | 24,074 | 28,596 |
| June | 6,387,608 | 213,769 | 331,871 | 5,227,488 | 614,480 | 5,642,004 | 379,803 | 22,039 | 23,460 |
| July-Aug. | 6,191,039 | 337,077 | 382,633 | 4,854,879 | 616,450 | 963,749 | 303,341 | 14,702 | 5,582 |
| Sept. | 6,873,352 | 236,809 | 316,590 | 5,636,288 | 683,665 | 4,618,718 | 404,948 | 22,719 | 17,604 |
| Oct. | 7,246,650 | 245,762 | 321,188 | 6,001,279 | 678,421 | 6,053,147 | 366,848 | 19,642 | 18,239 |
| Nov. | 6,977,457 | 140,277 | 354,573 | 5,831,885 | 664,051 | 6,450,404 | 446,449 | 22,548 | 19,064 |
| Dec. | 7,268,743 | 149,745 | 322,631 | 6,099,101 | 697,266 | 6,237,538 | 391,632 | 21,557 | 17,161 |
| Total | 75,301,134 | 2,402,861 | 3,733,258 | 61,900,276 | 7,264,761 | ..... | ..... | ..... | ..... |
| 1957 | | | | | | | | | |
| Jan. | 7,209,547 | 135,608 | 344,073 | 6,081,137 | 648,699 | ..... | ..... | ..... | ..... |
| Feb. | 6,596,133 | 154,543 | 294,491 | 5,414,732 | 730,794 | ..... | ..... | ..... | ..... |
| Mar. | 7,179,100 | 168,650 | 347,451 | 6,008,135 | 654,864 | ..... | ..... | ..... | ..... |
| 3 mo. | 20,983,177 | 458,801 | 986,015 | 17,504,004 | 2,034,357 | ..... | ..... | ..... | ..... |

*Source: U.S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For Sale only.

# new!

## NOW JOY BRINGS YOU THE WN-224... *Largest* "PACKAGE"-TYPE COMPRESSOR YET... UP TO 1000 HP

Here's a *new* approach to air compression in the 2418 to 6048 cfm range. Instead of long, heavy horizontal units resting on massive foundations, the Joy WN-224 has four cylinders arranged semi-radially around the frame. This compact, balanced arrangement assures smoother running, gives longer, longer service with far less maintenance.

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**Joy has had years of experience** with semi-radial design—pioneered it and proved it in hundreds of installations of the WN-114, a close cousin to this newer machine. Look over this specification chart . . . if you use compressed air in these volumes and pressures, you should find out more about the WN-224. Write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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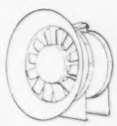
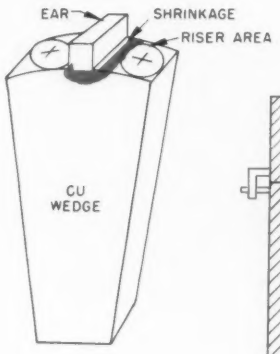
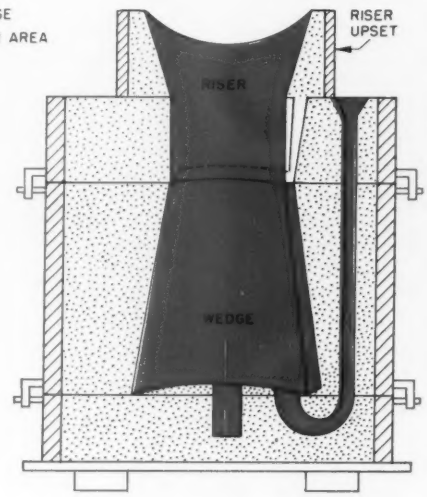

Fans and Blowers

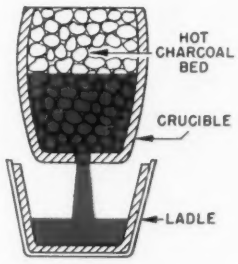
# Trouble Shooting

By C. W. AMMEN




Right — Shrinkage occurred in copper wedges under ear on the heavy section. Far right—The recommended molding practice is to put ear in drag, body in cheek and riser in cope. At lower right, sketch shows how copper heat is deoxidized by pouring it through a crucible filled with redhot charcoal. Metal flows into ladle through hole in crucible bottom.




# Making Oxygen-Free Copper

Dear Charlie:

A local steel shop has given me the job of making some copper wedges. They go between the holder and the electrode in sets of four per electrode or 12 for a complete installation. They are quite chunky and must be made of oxygen-free copper with a maximum of 2 per cent Zn. The ear to which the electric connection is made sits right on top of the heavy section and is loose. Well, aside from the usual troubles with gas, we come up with a shrink under the ear, regardless of the number of risers we place each side of the ear. After getting only a few which had to be welded in order to use them, the customer says that unless we come up with something soon he is going to redesign so that the wedges can be spun. Checking into these castings, we find that there seems to be a market for such items. How about a bit of dope on making oxygen-free coppers like these?

Sincerely,
Sam

Dear Sam:

There seems to be and probably will be for some time a good market for specials in oxygen-free copper, silicon bronze and aluminum bronzes, but your problem is a common one. Regardless of the amount of information available—and most of us know what not to do when making coppers—we all seem from time to time to bungle them. There are, as you no doubt know, several ways to deoxidize copper heats. Furnace atmosphere control, mold atmosphere and moisture also are important.

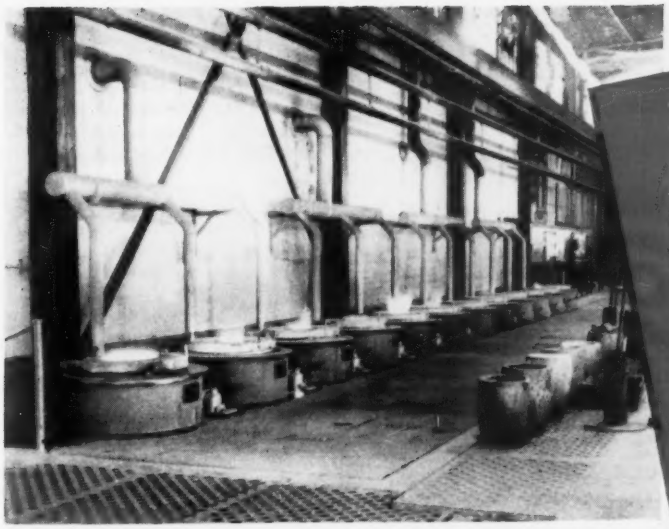
Before getting into the gating and molding of your problem casting, however, let's take up the melting of copper. In castings of this nature, it is best to use ingot copper or a very carefully selected, clean, No. 1 copper scrap. The copper is charged into a clean crucible and run down to a mushy or semiliquid state. At this point it is covered with redhot charcoal.

This red heat is extremely important, although it is not given enough attention by many foundryman. Charcoal will absorb moisture like a sponge, and what appears to be dry charcoal in many instances is wet enough that it adds moisture to the heat when used as a cover—and that is what we are trying to avoid.

You never should add charcoal unless it has been heated first and held for a period above the boiling point of water. Best practice is to have the charcoal at a red heat. This precaution sounds like a lot of trouble, but the results are gratifying.

**Oxidizing Atmosphere** — Melting should be done with a slightly oxidizing furnace atmosphere. If zinc is to be added, do it when the heat is within 50° of pouring temperature. It is best to add preheated zinc in the form of a sodium-zinc alloy, thereby performing two things at once. The zinc thus is added with a powerful reducing agent—the sodium—which will reduce grain structure, deoxidize and increase fluidity, without the retention of sodium either as a metal or an oxide. If no zinc is to be added to the melt, deoxidize with lithium. Phosphor-copper is O.K. if the melt can take a small percentage of phosphorus.

Copper heats never should be



A battery of gas fired, stationary Crucible furnaces at U. S. Naval Gun Factory, Washington, D. C. The pipes manifolded to each set of three furnaces supply air at one pound pressure. Proportional mixers assure constant gas-air ratio set for maximum fuel efficiency and proper furnace atmosphere.

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3. furnace lining and covers in good condition

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Used in Iron Foundries to increase carbon and improve machinability of castings. In Steel Foundries to increase combined carbon content.

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| **COLLOIDAL GRAPHITE** in various vehicles | **CORE PASTES** Strong bond, dry quickly. |
| **HYDRO GRAPHITE (It's New!)** Excellent permanent mold wash. | **SOAPSTONE—Talc** |
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| **CORE WASHES (All Types)** | **PIPE REDUCER** Used on gates and risers in steel and iron foundries. |
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*Circle 724 on Inquiry Card—Page 51*

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★ ★ ★ These superior PATTERNS are produced under the personal supervision of the two owners and a highly skilled group of employees.

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*Wood and Metal Patterns*
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poured without checking by pouring a couple of quenched samples, notched on the convex and fractured. Fracture usually tells the story. The metal runs from a dark brick-red to light brick-red to rose, then to a true rose with a silky, lustrous final appearance.

The ladle samples can be 2 in. in diam and ¾ in. thick. Should the sample show black specks and rise in center, possibly spewing liquid copper, or should it show a smooth, depressed surface without any visible specks while red hot—but on fracture reveal a single bubble beneath the apex of the depression, with a coarse columnar to cubical structure, brick-red in color, with no luster—the heat should be treated again, until the sample shrinks and the fracture is true rose and lustrous.

### Pour Melt through Charcoal

As a further measure in copper heats, I have seen a heat 50 or so degrees above pouring temperature removed from the furnace and poured through a bed of redhot charcoal. A crucible with a ¾ to 1-in. hole directly in the center of the bottom, filled with charcoal and held in a pit at a red heat, was used. The charcoal-filled crucible is pulled, placed over the preheated ladle, and the copper poured through to remove oxygen. Those who use this practice swear by it.

**Riser Area Is Small**—These wedges you speak of are a tough job. Getting them solid with the ear up is a problem because of restricted riser area. The best results I ever had with them were obtained by putting the ear in the drag, the body in the cheek and the riser in the cope. With the mold made the same way, but with no riser, you can pressure cast with a tall downgate—say 27 or 30 in. over the top of the casting.

To do this, lay the mold on its side, pour on a long angle and raise the mold to an upright position as it fills. This practice is used to a great extent with aluminum bronze when the job is deep and is gated with an inverted horngate. To prevent turbulence, etc., with the riser, you can pour with less fall, stop off the sprue and go over the top with feed metal.

Although this system of putting the heavier section in the lower part of the mold, with the light end up, is contrary to accepted practice, it does a good job.

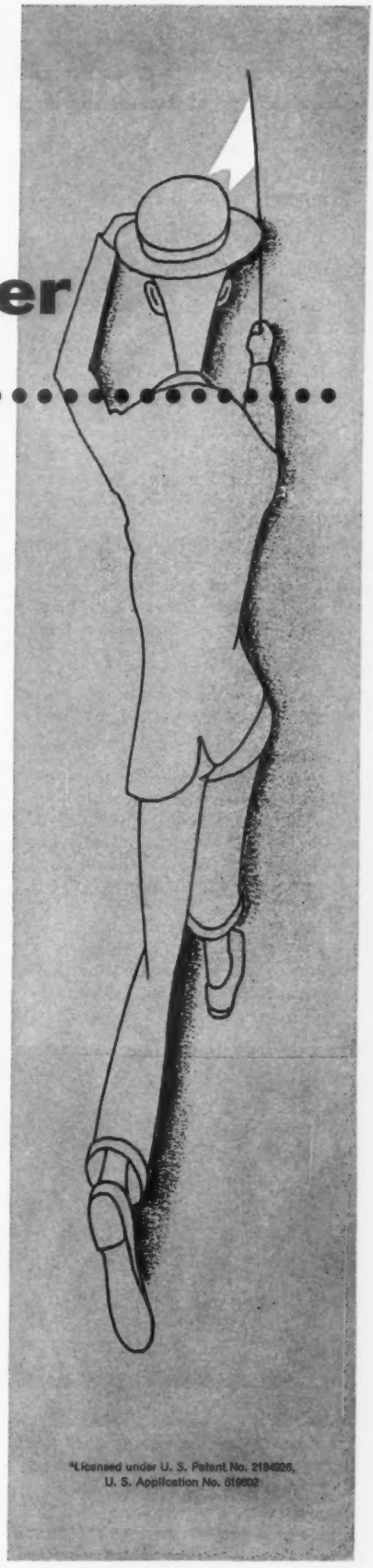
I for one would make this type of work in either dry sand or skin-dried molds as an added point of insurance.

Sincerely,
*Charlie*


*Circle 725 on Inquiry Card—Page 51*

For many years now, there has been a surge of movement towards National Metal's *Controlled*, premium abrasives: Permabrasive, pearlitic malleable shot and grit where annealed abrasives are indicated and Controlled "T" SHOT and grit, where fast cutting action is desired.

# Why be a tail-ender at a parade? .....



The parade of users has grown to sizable proportions—and why not? Controlled "T" is an unique shot and grit: the iron carbides are held in a ductile matrix, producing extremely fast cutting action coupled with long life, resulting in astounding savings in maintenance. Controlled "T" is the *only* low-priced shot that deforms instead of shattering when hit with a hammer! That's why this premium shot carries a written guarantee to save you at least 15% on abrasive costs figured on the price you are *now* paying!

On top of your 15% savings on abrasives alone—you also get that *added extra*—the savings on maintenance, that's all gravy—could be 20% or more—a *big bowl* of gravy!

You can prove this to *your* satisfaction *without* a formal test!

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# Foundry Group Meetings

**Oregon:** Apprentices were honored at the Mar. 20 meeting of the AFS chapter at the Heathman Hotel, Portland, Oreg. Winners were Wayne Miller, Crawford & Doherty Foundry Co., iron molding; James Rogers, Oregon Steel Foundry Co., steel molding; Jack Spackman, Pacific Chain & Mfg. Co., nonferrous molding; L. K. Bruenn, Dependable Pattern Works, wood patternmaking and Richard Rudig, Dependable Pattern Works, metal patternmaking.

At its Apr. 17 meeting at the same location, the chapter learned from M. E. Brooks, Dow Chemical Co., Midland, Mich., that reports of fire hazards in magnesium foundries are greatly exaggerated. Observation of ordinary rules will eliminate fire problems, he stated. The incidence of time-loss accidents in magnesium foundries is much lower than in foundries in general, and few of the accidents have anything to do with the combustible nature of magnesium, he reported.

Magnesium differs from aluminum in that it is more active chemically, lighter and contains less heat. It must be protected from the air by salt fluxes. Handling of the metal and tools, and gating and risering are all done with an eye to prevention of contamination and flux inclusion in the casting. Due to its quick freezing characteristics, the yield ratio averages about 20 per cent. Currently, military demands are the life blood of the magnesium business and very few foundries are surviving in the magnesium business without military orders.—*Bill Walkins, Electric Steel Foundry Co.*

**Western New York:** Nominations for officers for the 1957-58 meeting season are: Chairman, Edmund J. Burke, Hanna Furnace Corp.; vice chairman, Lou B. Polen, Allegheny Ludlum Steel Corp.; treasurer, Martin W. Pohlman, Pohlman Foundry Inc., and secretary, Avitus J. Heysel, E. J. Woodison Co.

Directors nominated to serve three years are: Albert E. Edwards, Chevrolet Foundry; William J. Mosler, Economy Pattern & Pressure Cast Products and Frank P. Breier, Tonawanda Iron Division, American Radiator & Standard Sanitary Corp.—*A. J. Heysel, E. J. Woodison Co.*

**Detroit:** A plant tour of Great Lakes Steel Corp., Division of National Steel Corp., Ecorse, Detroit, served as the Mar. 21 meeting of the AFS chapter. Arrangements were made through the Hanna Furnace Corp., Merchant Pig Division of National Steel Corp.

Nominations for officers and directors for 1957-58 are: Chairman, William Yaw, Cadillac Motor Division, General Motors Corp.; vice chairman, Cecil King, Chrysler Corp.; secretary, R. Grant Whitehead, Claude B. Schneible Co., and treasurer, Eugene J. Passman, Frederic B. Stevens Inc.

Directors (three years): Louis Pedicini, General Motors Corp.; R. B. Kropf, International Nickel Co.; Lee J. Curtin, Warner R. Thompson Co., and Chris A. Zanison, C. & S. Products Co. Directors (two years): E. G. Gentry, Penola Oil Co.; Harold C. Grant, Ford Motor Co.; T. Schroeder, Pontiac Motor Division, GMC, and Richard Lang (to fill unexpired term of Cecil King). Directors (one year): Art M. Clark, Ford Motor Co.; E. W. Gerhard, Swedish Crucible Steel Co.; R. J. Mundle, Jones-Mundle & Co., and R. H. Sutter, Sutter Products Co.—*Jess Toth, Harry W. Dietert Co.*

**Texas:** The well-known Harry W. Dietert Sand School, co-sponsored by the AFS chapter and the University of Houston, Houston, Tex., was held at the university on Apr. 5-6. Victor M. Rowell, executive vice president, Harry W. Dietert Co., Detroit, was the instructor.

The demand and market possibilities for castings of uniform high quality, importance of mold assembly in achieving high quality, mold and core aggregate materials, molding processes and techniques, properties of core and molding sand at room and elevated temperatures and the behavior of sands as influenced by additives were among the subjects covered.

Attendance was about 100, with some of the foundrymen driving as far as 650 miles to attend the school. A large number of those attending were from San Antonio, Fort Worth, Dallas and Shreveport, La., a drive of over 200 miles.

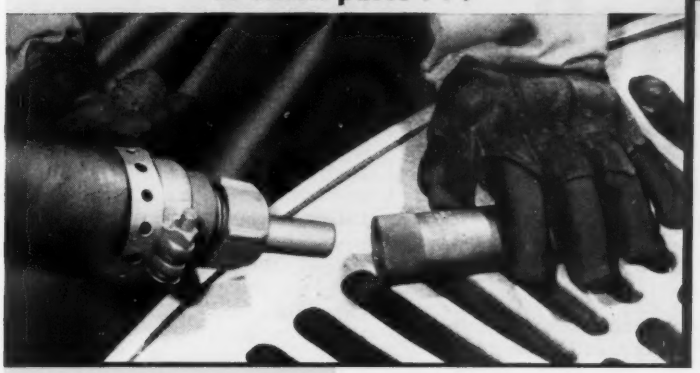
At its April 19 meeting, held at the Angelina Hotel, Lufkin, Tex., about 125 members and guests turned out for the evening session following morning visitations to Lufkin Foundry & Machine Co. and Texas Foundries Inc., and an afternoon devoted to castings clinics.

The steel clinic was moderated by William J. Buford, Texas Steel Co., Fort Worth, Tex. The iron clinic had Robert Lane, Lufkin Foundry & Machine Co., as its moderator and the nonferrous clinic was headed by King C. Tetley, Nibco of Texas Inc., Nacogdoches, Tex. Operating problems com-

PHILADELPHIA: Newly elected officers of the AFS chapter are shown as they got together at the recent East Coast Regional Conference in Philadelphia. Left to right are H. C. Winte, Florence Pipe Foundry & Machine Co., Florence, N. J., chairman; H. E. Mandel, Pennsylvania Foundry Supply & Sand Co., Philadelphia, secretary-treasurer; W. S. Giele, Walter Giele Co., Lebanon, Pa., outgoing chairman, and T. R. Walker, U. S. Pipe & Foundry Co., Burlington, N. J., vice chairman. Photograph through courtesy of Ed Klank, Philadelphia Coke Co.

# BLAST!

or small parts . . .



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| ASH | 1.5 MAX. |
| VOLATILE | .1 |
| MOISTURE | .9 |

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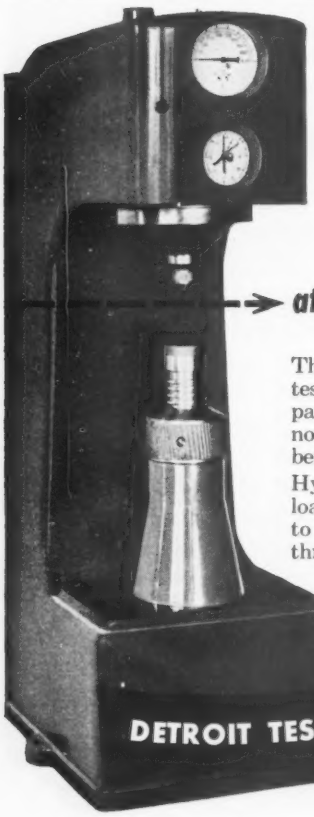
*Circle 728 on Inquiry Card—Page 51*





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mon to the individual groups were discussed.

At the dinner meeting, A. E. Stanfield, personnel director, Lufkin Foundry & Machine Co., provided a coffee talk on safety and personnel relations. Edward P. Trout, vice president, Lufkin Foundry & Machine Co., welcomed the group and Cal C. Chambers, president, Texas Foundries Inc. discussed general foundry conditions. —*C. Eugene Silver.*

**Northeastern Ohio:** About 200 members and guests of the AFS chapter assembled Apr. 11 at Tudor Arms Hotel, Cleveland, to honor national officers and apprentice contest winners. John Camden, in charge of the training section, Industrial Relations, Ford Motor Co., Cleveland, presented a short talk on "The Value of Apprenticeship."

Frank J. Dost, Sterling Foundry Co., past national AFS president, and W. C. Gilchrist, Cooper-Bessemer Co., Mount Vernon, O., and Frank Cech, Cleveland Trade School, national directors, attended the meeting as representatives of the national organization.

Mr. Cech talked briefly about the many programs undertaken each year by the national office including research projects, publications, educational activities, apprentice programs, foundry instructor seminars and the immediate plans of the AFS Institute which will get under way with its first courses to be given this summer.

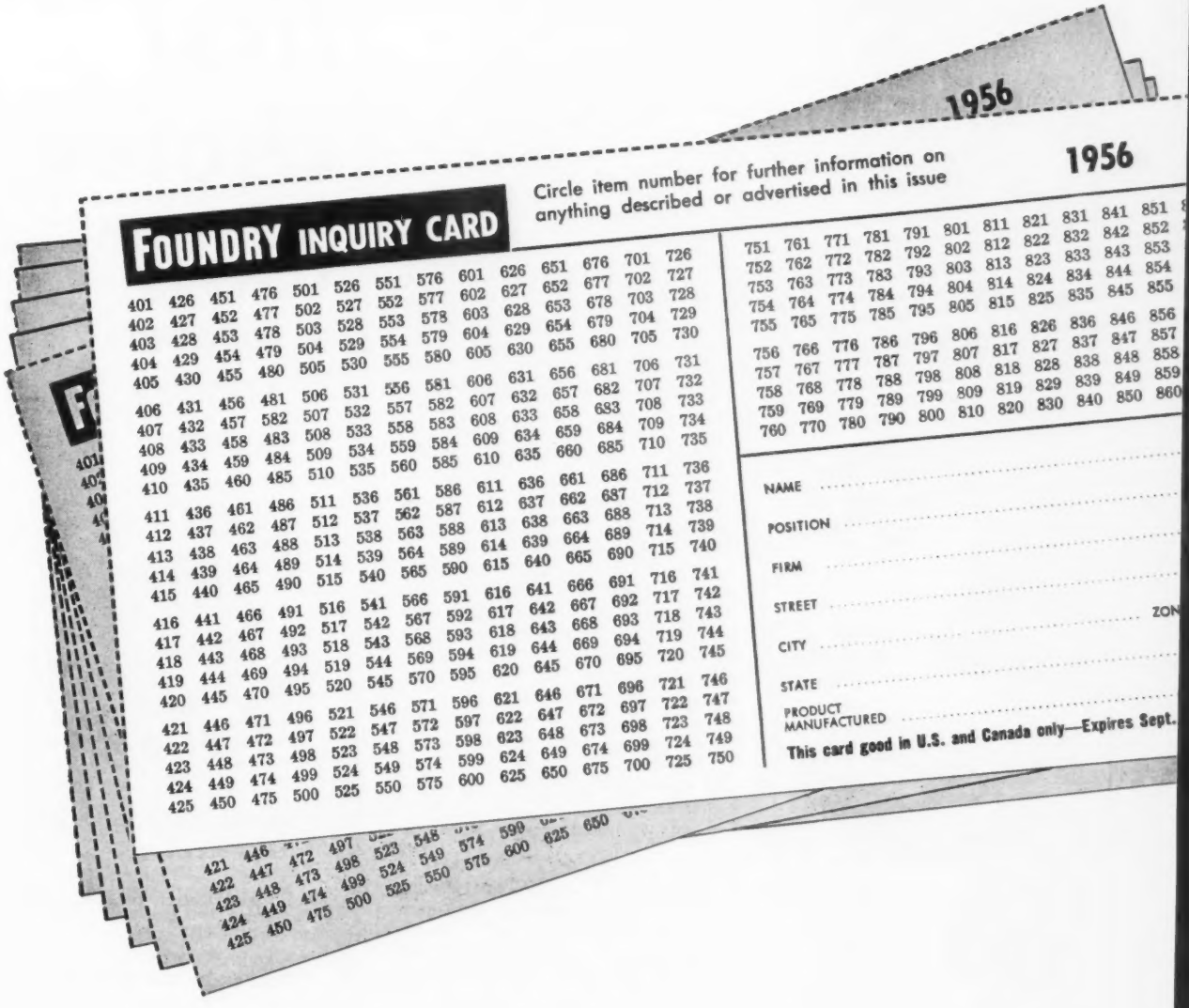
Walter Hehr, Mohawk Pattern Works, Inc., presented checks on behalf of the Pattern Manufacturers Group, Associated Industries of Cleveland, to these apprentice contest winners: Wood patterns—first, Douglas Petery, Cove Pattern Works Inc.; second, Edward Lamparyk, Modern Pattern Co.; third, W. A. Burd, Ford Motor Co. Metal patterns—first, K. C. Lapchynski, Ford Motor Co.; second, M. E. Salsbury, Ford Motor Co.; third, A. R. Snelly Jr., Ford Motor Co.

Emil J. Romans, National Malleable & Steel Castings Co., presented checks on behalf of the chapter to these apprentice contest winners: Nonferrous molding—first, Andrew Gerda, Wellman Bronze & Aluminum Co. Ferrous molding — first, Junior Samples, W. O. Larson Foundry Co.; second, Glen Mohr, W. O. Larson Foundry Co.; third, Carl Linger, W. O. Larson Foundry Co.

Lewis T. Crosby, Sterling Wheelbarrow Co., chairman, nominating committee, announced the following nominees for officers for 1957-58: Chairman, E. Claude Jeter, Ford Mo-



*Circle 729 on Inquiry Card—Page 51*

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**Slip Jackets**

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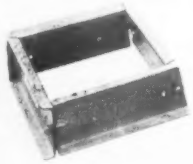
**Pats. Pend.**



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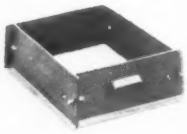
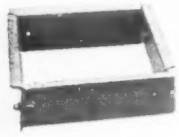
3/16" Steel
**"Eliminate Shifts"**

**Type II**
¼" Steel
**"Reduce Crushes"**





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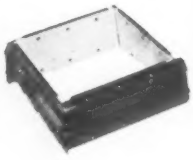
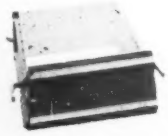
¼" Steel
**"Fewer Run-outs"**

**Type IV**
10 Gauge Steel
¼" Transite
**"Less Maintenance"**





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tor Co.; first vice chairman, Emil J. Romans, National Malleable & Steel Castings Co.; second vice chairman, A. H. Hinton, Aluminum Co. of America; secretary, Howard E. Heyl, Federal Foundry Supply Co.; treasurer, Harold R. Strater, North American Refractories Co.

Board of directors, nominees, three-year term, are: Lawrence R. Lansky, Superior Foundry Inc.; W. O. Larson Jr., W. O. Larson Foundry Co.; Gordon L. Paul, Sterling Foundry Co.; James J. Schwalm, Federal Foundry Supply Co. and J. Doyle Robbins, Osborn Mfg. Co. One-year term to fill unexpired term of A. H. Hinton: William E. Mahoney, Madison Foundry Co. Alexander D. Barczak, Superior Foundry Inc., will join the board for one year as immediate past chairman.

In his evaluation of apprentice training, Mr. Camden emphasized that there is a vital need in industry for companies to maintain and improve their competitive positions by building the highest possible degree of skills within their own organizations. This can be accomplished through apprentice training programs that continue to train skilled craftsmen who become the new blood in a particular trade. The continual flow of trained apprentices into any trade always serves to improve the standards of skills already within it.

The chapter's annual picnic and golf outing is scheduled for Twin Lakes Country Club, near Kent, O., on June 22.—*Kenneth L. Mountain.*

**Toledo:** A unique panel discussion featuring representatives of area foundries featured the Apr. 3 meeting of the AFS chapter at Heatherdowns Country Club, Toledo, O. Short talks were presented covering new ideas, equipment, material handling, employment peculiarities, and unusual patterns and castings in the various operations. C. M. Hannaford, Unitcast Corp., acted as moderator.

Panelists were V. E. Zang, Unitcast Corp.; B. J. Beierla, E. W. Bliss Co.; Harry Schwab, Bunting Brass & Bronze Co.; Ed Metzger, Multi-Cast Corp.; Elmer Deerning, Maumee Malleable Castings Co.; John Cauffiel, St. Clair Bronze & Aluminum Co.; Fred Murschell, Farrell Cheek Steel Co.; Paul Guilford, Central Foundry Division, General Motors Corp., and Cloyce Taylor, Alloy Founders Inc.—*R. C. Van Hellen, Unitcast Corp.*

**Connecticut Non-Ferrous:** William Geisler, Davenport Machine & Foundry Co., talked about "Principles of Core Shooting" to the Connecticut Non-Ferrous Foundrymen's As-


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sociation on Mar. 20 at the Quinnipiack Club, New Haven, Conn.

In a carefully prepared, illustrated talk Mr. Geisler described the operation and theory of core shooting. Some of its advantages are: It is possible to shoot ordinary sand, sodium-silicated bonded sand, dry or coated shell sand or high strength molding sands; wood boxes may be used; fill time is less than in blowing; there is no "piping" of sand in the cartridge, nor are agitators necessary; air consumption is reduced; venting is minimized to allow atmospheric air to escape and the low pressure used reduces corebox wear.—*Ralph D. Tierney.*

**Chicago:** Some 200 members and guests of the AFS chapter attended the April 1 meeting at the Chicago Bar Association and participated in four roundtables. At the Gray Iron division meeting, K. J. Jacobson, chief chemist, Griffin Wheel Co., showed a motion picture portraying the "Unusual in Foundry Practices." Robert Cech, malleable foundry engineer, National Malleable & Steel Castings Co., addressed a joint Malleable and Pattern division session on "Gating and Risering."

J. E. Fitzwater, supervisor of welding section, Manufacturing Research, International Harvester Co., discussed "Powder Cutting and Washing Technique" before a joint Steel and Maintenance division meeting. The Nonferrous division heard Roy Cochran, metallurgist, R. Lavin & Sons Inc., speak on "Nonferrous Melting."

Morris Horwitz, engineer, Chicago Malleable Castings Co., alerted foundrymen by reporting that Cook County is about to prepare a new zoning code and it likely will follow the severe pattern on smoke, noise and construction recently proposed for the city of Chicago. Progress is being made in getting the standards moderated in the Chicago code, but suburbs may find themselves in trouble unless foundries and other industries participate in the code-making activities.

At the chapter's April 29 meeting at the same location, Charles F. Christopher, research metallurgist, Continental Foundry & Machine Co., East Chicago, Ind., talked about "Excuses and Alibis for Poor Castings." He emphasized the need for knowing all the facts and pointed out that getting the facts is one of the important functions of research.

The slate of candidates nominated at the April 1 meeting (FOUNDRY, May, p. 369) was declared unanimously elected. Outgoing president Robert P. Schauss, Chicago manager, Werner G. Smith Inc., was presented with a

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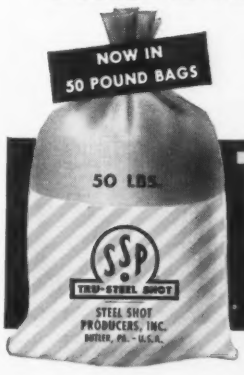


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statuette in recognition of his service during the year.

The annual stag outing will be held at Nordic Hills Country Club, Itasca, Ill., on Aug. 10. An attendance of 500 can be accommodated.—*Erle F. Ross.*

**St. Louis:** Apprentice Contest Month for the AFS chapter was culminated at the March meeting by awarding prizes to the winning contestants as well as certificates of training and copies of the *Machinery Handbook* to a group of young patternmakers who have completed a prescribed five-year apprentice training program.

First-prize winners in the apprentice contests were Joseph Wilson, Central Pattern Co., metal patternmaking; Charles Simpson, Tower Grove Foundry Division, Laclede Stoker Co., and Richard Dvorak, Consolidated Pattern Co., wood patternmaking.

Robert H. Jacoby, St. Louis Coke & Foundry Supply Co., was the technical speaker and he discussed "Uniform Casting Quality" emphasizing the importance of an over-all quality program reaching into every phase of a company's operations. He indicated that uniform casting quality is a result of careful planning and the placing of full responsibility upon those concerned with quality functions.

A foundry practice and alloy development laboratory at Washington University, St. Louis, to be used in conjunction with the school's new four-year curriculum in metallurgical engineering, has been remodeled and equipped from a $15,000 gift of General Steel Castings Corp. New equipment in the laboratory includes an induction melting furnace, a controlled atmosphere heat treating furnace, a tensile tester and an x-ray diffraction unit.—*Ralph Johnston, East St. Louis Castings Co.*

**Wisconsin:** Several technical sessions and a coffee talk by Fred W. Zirkel, director, West Allis Recreation Department, on "The Braves—The Pennant—What Else?" featured the Apr. 12 meeting of the AFS chapter at Hotel Schroeder, Milwaukee.

The candidates who were announced in the May FOUNDRY, page 366, were elected to serve the chapter during the 1957-58 season.

The gray iron section heard J. G. Winget, Reda Furnace Co., Bartlesville, Okla., talk on "Melting Gray Iron in a Reverberatory Type Furnace." J. J. Broecker, Lakeside Malleable Castings Co., acted as chairman. Clyde Sanders, American Colloid Co.,


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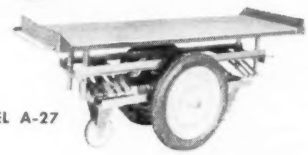

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addressed the malleable group on "Malleable Iron Molding Sands." N. J. Gross, Belle City Malleable Iron Co., chairmanned this session.

Donald L. LaVelle, sales division, Kaiser Aluminum & Chemical Co., discussed "Aluminum Casting Defects and Their Correction" at the nonferrous session. Robert Eck, Eck Foundries Inc., was chairman. The pattern section heard a roundtable discussion of "Your Pattern Shop Problems" with Gilbert Willms, Caterpillar Tractor Co., serving as moderator and Erwin Czerzinski acting as chairman at the well-attended meeting.—*John E. Hubel.*

**Pittsburgh:** The first of two meetings as part of the AFS chapter's educational program was held Apr. 15 at Webster Hall Hotel, Pittsburgh, with Prof. W. O. Philbrook, Carnegie Institute of Technology, speaking on "The Freezing of Steel Castings." This meeting and the May meeting were planned to create interest in the future needs of the foundry industry for engineers and skilled workers, who must be encouraged to enter the industry if it is to survive.

Prof. Philbrook discussed problems of crystal growth and demonstrated how metal flow affects castings. With slides, he explained the change in volume which takes place as metal freezes. He showed how pipes form in an ingot and explained what can be done to solve the problems involved.

Nominees for officers for the 1957-58 season include George Miklos, Westinghouse Electric Corp., president; I. W. Sharp, American Steel Foundries, vice president, and E. P. Buchanan, Pittsburgh Coke & Chemical Co., secretary.—*Robert M. Love.*

**Saginaw Valley:** "How Health and Hygiene Affect Foundry Cost" was the subject of William G. Ferrell, vice president in charge of manufacturing, Auto Specialties Mfg. Co., St. Joseph, Mich., as he talked to the AFS chapter at its April 4 meeting at Fischer's Hotel, Frankenmuth, Mich.

Mr. Ferrell discussed the high cost of accidents and the importance of making and maintaining a complete record of each employee's health before and after hiring. Compensation claims can be made as long at 25 years after lay-off. He detailed how his company improved its safety record from a position of being unable to buy insurance in 1930 to having won the National Safety Award for machine shops and foundries in 1933 and 1934.—*Ormond Requadt, Dow Chemical Co.*

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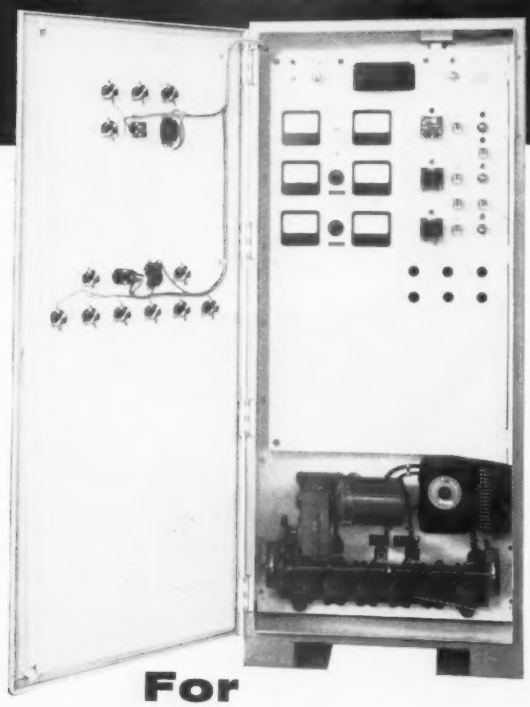

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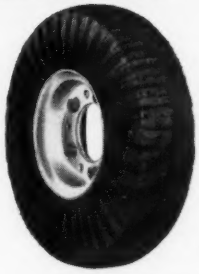

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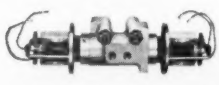

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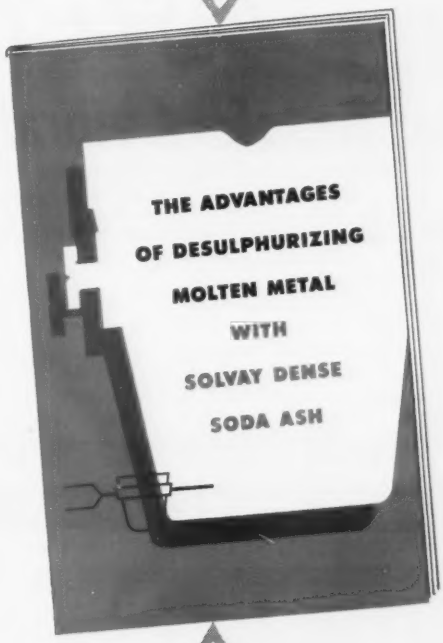


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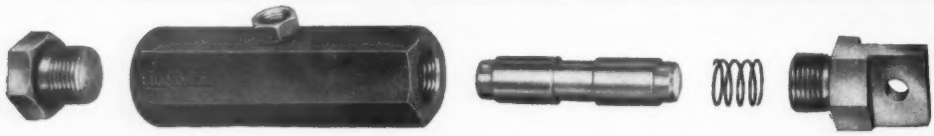

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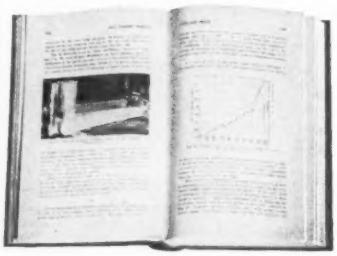

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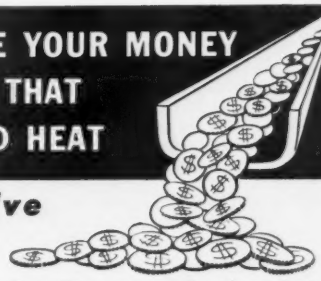

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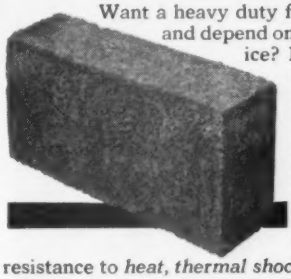

Want a heavy duty floor you can lay down *fast* . . . and depend on for *years* of trouble-free service? Investigate EMERI-BRICK*. Made of the same pure CORTLAND EMERY AGGREGATE and Calcium Aluminate Cement as famous *heat resistant* EMERI-CRETE FLOORING, in a convenient precast, precured form, EMERI-BRICK provides a floor with incredible resistance to *heat, thermal shock* and *heavy wear.* That's why leading foundries and steel mills swear by it. Get the facts—write for free information today. Complete specifications provided for every installation.

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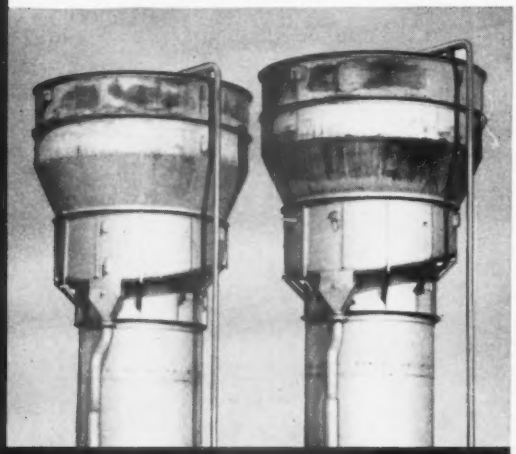
SCHNEIBLE

YOU CAN BE SURE YOUR CUPOLA EMISSIONS ARE CONTROLLED WHEN YOU USE A SCHNEIBLE "SW" COLLECTOR



Selection of your cupola collector is becoming more and more important. The enactment each year of municipal codes that restrict cupola emissions to certain definitive limits prove this. Schneible's "SW" Type, America's most popular wet method cupola collector, you can buy with complete confidence.

Schneible Cupola Collectors are designed for simplicity and efficiency of operation. They are practically maintenance-free, with no moving parts, no nozzles to clog, nothing to freeze in the coldest weather.

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Determine proper gating faster, eliminate slag inclusions, stop rejects, reduce cleaning room time, and lower production costs. UNIVERSAL *refractory* gating components will help you do this, and at less cost than producing your own from sand. Send specifications for price and delivery quotations, or call SAndusky 4631

WRITE TODAY FOR CATALOG LISTING SPECIFICATIONS OF STANDARD GATING COMPONENTS

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GLOSSARY OF FOUNDRY TERMS
*Compiled by Ed Bremer, FOUNDRY Metallurgical Editor*

This extensive glossary of foundry terms was compiled from a wide variety of sources. Arranged in handy booklet form, it is a valuable reference for every foundryman. 48 pages. $1.00

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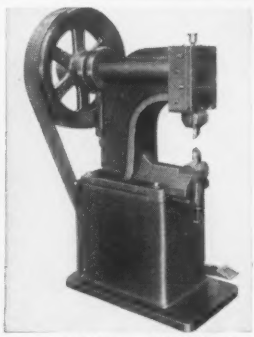
Sprue Cutter
*for*
*Non-Ferrous Foundries*



- Cuts Sprues and Gates with One, Swift, Sure Stroke.
- Does away with tedious hand labor.
- Speeds flow of work through cleaning department.
- Built for years of Rugged, Low-Cost Service.
- 2 Sizes, ¾" and 1¼" square. Built-in electric motor or belt drive.

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*Circle 750 on Inquiry Card—Page 51*

in new
all-weather
sanitary, tamper-proof
"throw-away" dispensers
of high impact styrene plastic

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2 sizes
500 Tablets
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Easily Put Up
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IMPREGNATED SALT TABLETS

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Impregnated to Prevent "Salt Sickness". Each salt crystal individually coated to give slow, controlled dissolving, to prolong benefits and eliminate nausea.

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Branches in Principal Industrial Cities
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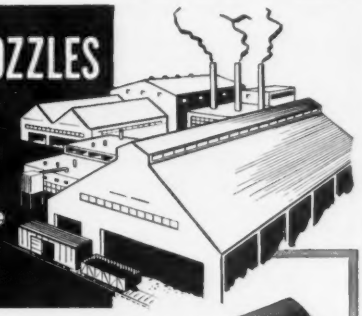
*Circle 751 on Inquiry Card—Page 51*



**SPRAY NOZZLES**
to improve general foundry operations and increase product quality



Complete choice of nozzle types and capacities for every foundry need. Typical spray nozzles supplied are:

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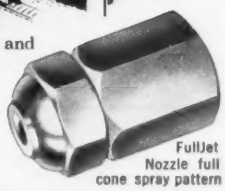
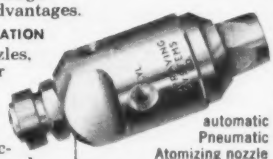
Fulljet or Whirljet spray nozzles in any material or capacity to fit your system. Open internal design and large orifices for non-clogging advantages.



FullJet Nozzle full cone spray pattern

**FOR AUTOMATIC MOLD LUBRICATION**

Pneumatic Atomizing nozzles, pneumatically actuated for required intermittent operation.



automatic Pneumatic Atomizing nozzle

Made by America's leading designers and manufacturers of industrial spray nozzles.

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ADVANCE SPRAY NOZZLE DESIGN FOR NEW DIMENSIONS IN CONTROL AND PERFORMANCE

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Complete stock of spray nozzles maintained for prompt delivery.

For complete information write for Catalog 24... forty-eight pages of complete nozzle data.

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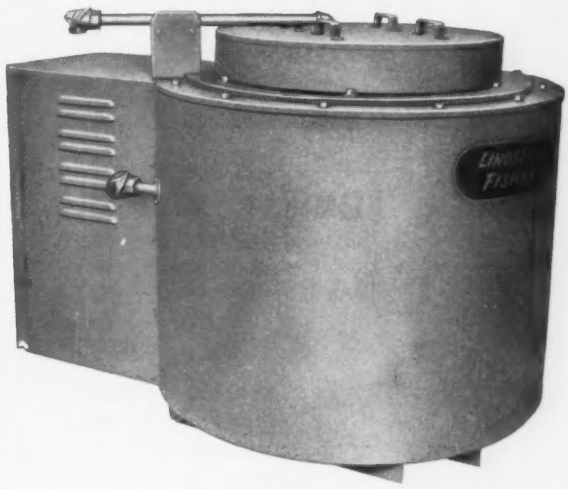
# New From Lindberg-Fisher

**For Permanent Mold and Sand Casting of Aluminum, Magnesium, Zinc and Lead.**

**A Lindberg-Fisher Electric Resistance Melting Furnace can mean lower cost per lb. of finished casting.**



These furnaces eliminate localized heating of metal, eliminate gas absorption, because there are no products of combustion present. Higher production results, due to less operator fatigue. Exhaust fumes and smoke are nonexistent and radiation loss is held to an absolute minimum by use of high quality insulation.

Longer crucible or pot service and low furnace maintenance are obtained with the patented long life, low voltage elements.

Can also be used as a holding furnace on die casting applications.

*Write for Bulletin No. 320*

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*A Division of Lindberg Engineering Company*

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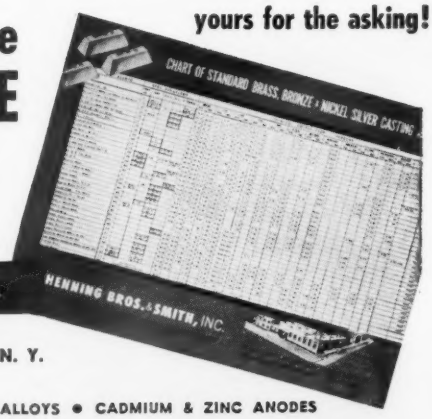
This see-at-a-glance wall chart will save you hours of time in making up your specs. Chart shows all types of customer specifications: Navy, S.A.E., A.S.T.M., and Federal. It shows chemical composition, by percentages, of 37 alloys. Write today for your copy to:

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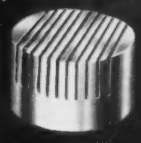
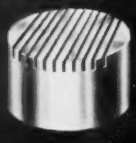
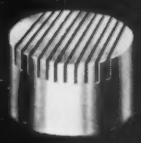
## SLOTTED CORE BOX VENTS



X-TRA DEEP HEAD .156 Wide Slots .014



SHALLOW HEAD .031 Wide or Narrow Slots .014 .010



DEEP HEAD .093 Wide or Narrow Slots .014 .010

$CO_2$ TYPE DEEP HEAD .093 Wide or Narrow .014 Slots .010

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- MOST ECONOMICAL METHOD for INSERTING CORE VENTS
- CORRECT DEPTH
- UNIFORMITY OF HOLES
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- FOR CLEANING SLOTS
- MADE OF TEMPERED STEEL
- EASY TO USE

Manufactured by **C.M. SMILLIE & CO.** 1124 WOODWARD HGTS., FERNDALE 20, MICH

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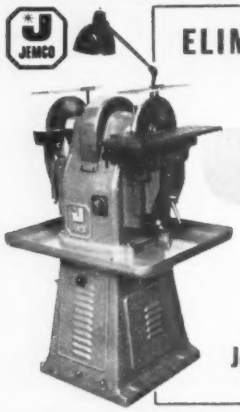

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**NEW 36 PAGE HANDBOOK**
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13 HELPFUL CHAPTERS ON ALL PHASES OF THE CUPOLA. "How To Use The Cupola" .... 13 idea-packed chapters based on the practical experience of a man who has devoted his life to foundry fuel and melting problems. It's a mighty useful handbook—a handy source of information which will pay for itself many times over in the months and years ahead.

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*all styles, metals, weaves ... any size, quantity!*

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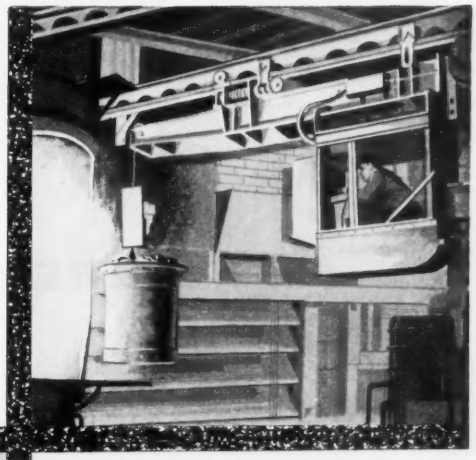

## FOUNDRY INSTALLATIONS

**Commercial Contracting Corporation has installed or modernized foundries for all the major automotive producers. Utilize this experience to up-date your own foundry facilities.**

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**COMMERCIAL CONTRACTING CORPORATION**

GENERAL CONTRACTORS

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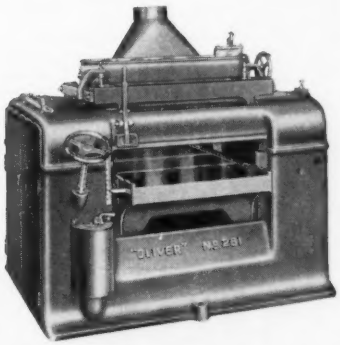
# OLIVER 30-in. Planer

## helps produce accurate, smooth patterns at low cost



Takes stock up to 30″ wide, 8″ thick. One-piece base assures permanent alignment of parts. Upper housing is one-piece. Feed mechanism enclosed for safety and longer life. Enclosed worm gear drive for feed rolls. Revolving parts mounted on ball bearings. Unique chip-breaker. Excellent braking system. Write for Bulletin No. 261.

Oliver makes a full line of Planers, Jointers, Pattern Lathes and other woodworking machinery for pattern shops

**OLIVER MACHINERY COMPANY**
**Grand Rapids 4, Michigan**

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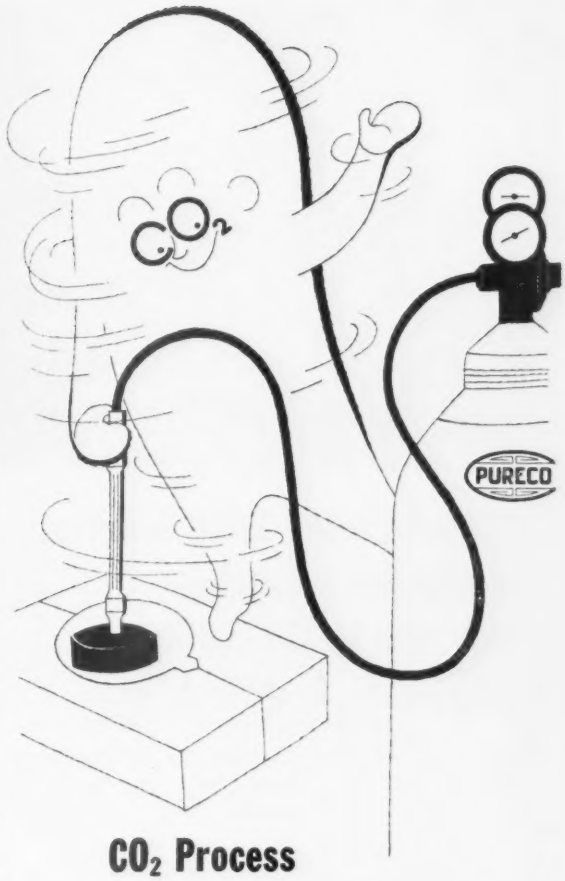


# $CO_2$ Process cures molds and cores in seconds—without baking—

## Equipment Cost: Less than $100!

Pureco can tailor a $CO_2$ installation to meet your specific foundry requirements–whether they be large or small.

Call your nearest Pureco office for information regarding a complete line of $CO_2$ equipment and $CO_2$ supply systems–cylinders, cylinder banks, converters, receivers–all described in Bulletin #27. Write for your copy.

Remember–Pureco Technical Sales Service is anxious to serve you.

PURECO $CO_2$

***Pure Carbonic Company***

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150 EAST 42nd STREET, NEW YORK 17, N. Y.

*AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT*

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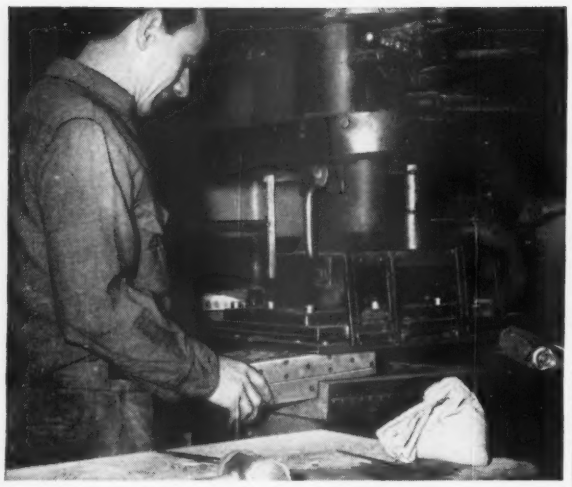

## READING GRAY IRON increases quality and production with new McKEE-DODGE UNIVERSAL BLOWPLATE*

Read what Warren I. Noll, General Manager at Reading Gray Iron Castings, Inc., Reading, Pa., says about this latest contribution of Dodge engineering . . .

"We feel confident that the McKee-Dodge Universal Blowplate, adapted to our Champion blower, has added considerably to the high quality of our castings. We can blow out more uniform cores now because of the top venting. An increase in production has resulted from the ease in using this equipment, too. And, it has added great flexibility to our machine in the use of all kinds of core boxes—wooden and metal—which is very important to a jobbing foundry of this kind. In fact, we're pleased with it in every detail."

*You* can boost quality and production in *your* foundry, too! Why not start *today!*

*Patent Pending

Send for your free copy of Bulletin FP-855 for complete details on how McKee-Dodge Universal Blowplate can help you.

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**DODGE STEEL COMPANY**

FINISHED PRODUCTS DIVISION

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THE MOST IMPORTANT ALLOY IN A STEEL CASTING IS QUALITY

Zircon Sand

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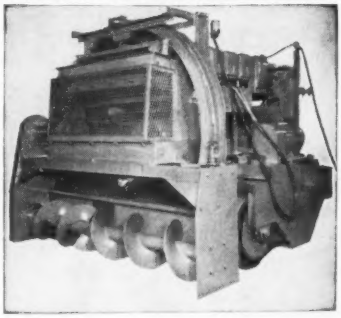
## UP TO A TON A MINUTE AT LOWEST COST! with the RINGLIFT SAND CONDITIONER



Revolutionary new principle. Mixes, adds water, lifts all sand from floor, screens, magnetically separates, aerates. Cools hot sand. Cuts swath to 104", turns in 63" radius. Straddles 24" high x 70" windrows. Most economical machine of its type to buy, operate and maintain. Send for folder.

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# EMPIRE

## "THAT GOOD" FOUNDRY COKE

**DEBARDELEBEN COAL CORPORATION**

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Phone: ALpine 1-9135



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Circle 765 on Inquiry Card—Page 51

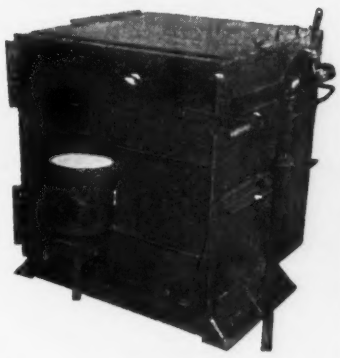
# CENTRIFUGALLY CAST

**AUTOMOBILE CYLINDER LINERS**

**DIESEL ENGINE LINERS**

**BRONZE BUSHINGS**

on the new
WATER COOLED
Model M-WC
(Illustrated)



Utilizes low cost permanent molds of available steel tubing to produce gray machinable cast iron or bronze bushings. Water cooled molds can be maintained at either high or low temperature easily. High or limited production in very small space with unskilled labor. Completely safe for workmen. Simple, sturdy equipment. Quick changeover from one mold to another. Practically 100% metal yield of high quality, denser castings. Metal porosity eliminated.

*Write for New Bulletin #257 Illustrating Model M-WC*

**RESEARCH FACILITIES**

We have available an Experimental Foundry equipped for ferrous and non-ferrous melting for both vertical and horizontal centrifugal casting production. Our facilities are available to foundries for research or trial centrifugal castings at low cost.

Centrifugal Casting Machine Co.

P. O. Box 947 Tulsa 1, Okla.

*Circle 766 on Inquiry Card—Page 51*

# WHAT DO YOU NEED IN A COST METHOD

The simplest and most complete method of costing ever prepared for nonferrous foundries is found in

## *BASIC COST PRINCIPLES FOR NON-FERROUS FOUNDRIES*

(Non-Ferrous Founders' Society Publication)

Up-to-the-minute guide for costing in both small and large foundries. Prepared by practical foundrymen, based on 10 years of research and experience of the industry under Government Pricing Regulations.

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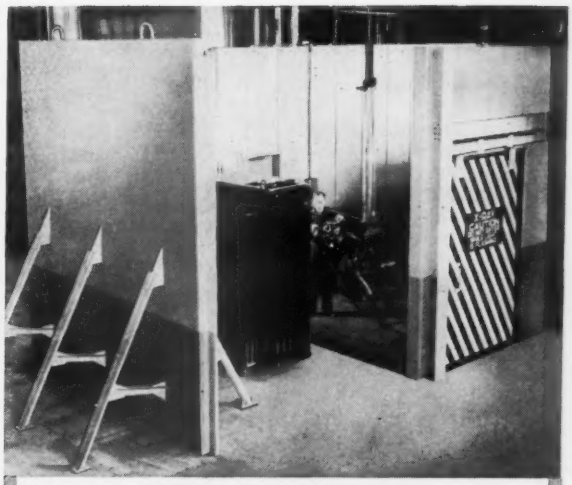

# AMERAY X-RAY PROTECTIVE ROOM *with* PORTABLE WALL

**DESIGNED, FABRICATED AND INSTALLED FOR WESTINGHOUSE**

Ameray, specialist in the design, fabrication and installation of X-Ray protective materials, has recently completed a 13' x 20' x 12' high X-Ray room to enable Westinghouse to inspect its completed industrial transformers.

Ameray designed the protective room, pictured above, to meet Westinghouse production requirements. The unique feature of this room is the portable wall with supporting legs and lifting hooks (above left shown in remote position) which may be moved to accommodate any sized transformer and still effectively keep X-Ray dosage well below maximum tolerance limits. This 5000 ton lead-lined, steel-faced unit was designed to be handled by existing overhead crane facilities.

Ameray's extensive experience can offer you the best and most economical solution to your particular X-Ray protective problems.

WRITE AMERAY TODAY FOR X-RAY CATALOG #37E. AMERAY WILL BE HAPPY TO DISCUSS YOUR SHIELDING PROBLEMS AT NO COST OR OBLIGATION.

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FOXCROFT 6-4100
NEW YORK PHONE: BOWLING GREEN 9-0412

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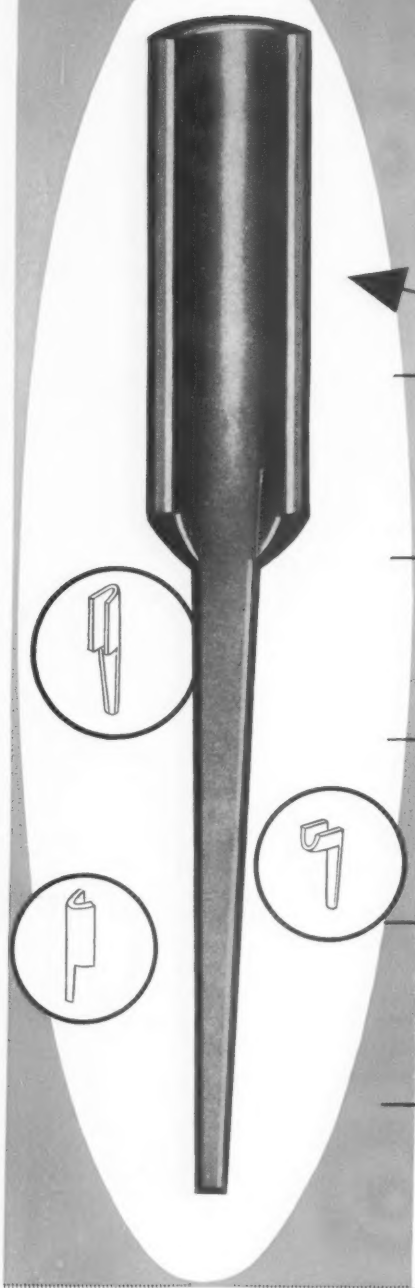
# FUSET*

## CHILL NAILS



*Superior Performance through Superior Design!*

*** ORIGINAL DESIGN**

First open channel chill embodying scientific principles of mass plus surface. Patented design provides more chill and fusion area.

*** MASS PLUS SURFACE**

Unique combination of two heat-conduction principles permits higher degree of chilling efficiency than ever before obtainable.

*** IMMEDIATE CHILLING & FUSION**

Balanced arrangement of maximum surface with correct cross section thickness transfers heat faster and enables finest possible fusion!

*** IMPROVES QUALITY**

Exclusive channel design permits maximum parent metal fill-in around chill—increases casting strength—allows better control of shrinkage and solidification.

*** LOWERS COSTS**

Less bulk lowers shipping, coppering, storage, plant handling and labor expenses. Fuset efficiency reduces scrap, welding and finishing costs.

*PATENT NOS. 2,731,688, 523,412, 540,053, 1,710,268, 540,688. OTHERS PENDING.
*TRADE MARKS REGISTERED

FUSET* CHILL NAILS ARE MADE IN A WIDE RANGE OF SIZES. EXCLUSIVE FEATURES ARE ALSO AVAILABLE IN FUSERT* CHILLS FOR LIGHT OR HEAVY SECTIONS AND FUSPIDER* CHILLS FOR A LARGE VARIETY OF APPLICATIONS.

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1449 WHIPPLE RD. S. W.
CANTON, OHIO

# CLASSIFIED ADVERTISING

## Help Wanted

**PRESIDENT**

Exceptional opportunity for man to head successful and rapidly growing manufacturer of foundry supplies. Present organization provides excellent support in administration, production, finance, engineering and research.

Strong grounding and successful record in marketing, especially sales management, is essential. Formal or practical training in metallurgy, foundry practice, or chemical engineering is important.

Desired age: 38-55 years. Compensation: salary, profit-sharing and stock option. All replies confidential. Please forward resumes to:

**BOX 608, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, O.**

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**OPPORTUNITY**

LONG ESTABLISHED AND SUCCESSFUL MEDIUM-SIZE MALLEABLE CASTINGS FOUNDRY NEEDS MAN WHO IS PRESENTLY A FOREMAN OR ASSISTANT SUPERINTENDENT AND HAS THE ABILITY AND AMBITION TO TAKE ON INCREASED RESPONSIBILITY AND ADVANCE IN ORGANIZATION. MUST HAVE ACTUAL OPERATING EXPERIENCE AND PRACTICAL KNOWLEDGE OF SAND, MELTING AND MOLDING. VERY IMPORTANT TO BE A GOOD ORGANIZER AND BE ABLE TO GET RESULTS WORKING WITH FOREMAN DIPLOMATICALLY AND EFFECTIVELY. AMPLE OPPORTUNITY WILL BE PROVIDED TO BECOME FAMILIAR WITH ORGANIZATION AND OPERATIONS BEFORE TAKING ON RESPONSIBILITY. ALL COMMUNICATIONS CONFIDENTIAL. SEND COMPLETE RESUME OF EXPERIENCE AND TRAINING TO:

**BOX 609, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**INDUSTRIAL ENGINEER**

Progressive company engaged in basic process and pyrometallurgy offers unusual opportunity for industrial engineer, preferably having experience in steel or other heavy industry. Must be capable of establishing and administering job evaluation program. Experience in time and motion study as well as material handling desirable. Location northeast section of United States. Position will require some travel to midwest and southern plants. All replies held strictly confidential. Submit detailed resume covering education background, experience and salary requirements. Address: Box 552, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**QUALITY CONTROL**

Grey iron foundry on Eastern seaboard has opening for exceptional individual. Progressive expanding organization with unusual possibilities for future. Must have extensive knowledge of all phases of sand control and preparation, cupola operations and lab and testing program. Full responsibility for these phases reporting directly to top foundry management. Requires unusual combination of metallurgical knowledge and practical know-how. Send complete resume in strictest confidence. Address: Box 558, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Help Wanted

**NEW FOUNDRY SEEKING MANAGEMENT MINDED MEN**

A major company must staff a new steel foundry in Texas with qualified individuals interested in their own future and in the challenge of being part of the development of a modern facility. Interested parties should forward a complete resume of their background and experience. Strictest of confidence will be respected for all answers. Positions open at the present time include:

| | |
|---|---|
| GENERAL FOREMEN | CASTING ENGINEERS |
| MELTING FOREMAN | EQUIPMENT ENGINEERS |
| MOLD FOREMAN | METALLURGISTS |
| CORE FOREMAN | CHEMISTS |
| CLEANING FOREMEN | CHEMIST TECHNICIANS |
| PATTERN SHOP FOREMEN | INDUSTRIAL ENGINEERS |

**BOX 615, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**PATTERN DRAFTSMEN**

Experienced in the design of pattern equipment, core boxes, qualifying fixtures, and gauges.

Excellent Salary
Permanent Position

Unlimited opportunities with a large, gray iron foundry in Northwestern Ohio.
Write stating qualifications or phone:

**PERSONNEL DEPARTMENT**
**DEFIANCE PLANT — CENTRAL FOUNDRY DIVISION**
**GENERAL MOTORS CORPORATION**
**DEFIANCE, OHIO**
**Phone: Defiance 2-2915**

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**FOUNDRY FOREMAN**

For a small aluminum and iron shop, modernly equipped. Clean, light and air conditioned. Steady job and good pay for a competent man. Location: Cleveland, Ohio.

**BOX 625, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**FOUNDRY FOREMAN**

To handle the production on rollover molding machines and large floors in gray iron foundry in Southwest. Please give references and complete experience in first letter.

**BOX 627, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**HELP WANTED**

Mechanical Engineer—with foundry background for production supervision in HEAVY CENTRIFUGAL FOUNDRY, NONFERROUS. Address: Box 599, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**CHEMIST**

Experienced chemist to do research work and development work on Core Oils and allied foundry items. Location: Michigan. Address: Box 597, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Help Wanted

**FOUNDRY SALES ENGINEER**

A progressive Aluminum Foundry located in Northern New Jersey, requires a competent experienced casting salesman. Must be fully conversant with pattern equipment and castings, and have comprehensive knowledge of customer liaison. Submit detailed resume of personal description (marital status included) and professional record (emphasizing casting sales experience). Replies confidentially treated.

**BOX 612, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**HELP WANTED**

Would like to contact individual or company, having a thorough knowledge of production, iron, malleable or steel shot. Must be capable of setting up and operating complete plant. Give details and telephone number so that we may contact for personal interview, in strict confidence. If you have "know how" age would be no barrier.

**BOX 624, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**MELTER**

Need melter with stainless steel background. Induction melting facilities 30 to 2000 lbs capacity.

Excellent opportunity to grow with aggressive young company in suburban Milwaukee area.

**BOX 623, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**FOUNDRY PLANT ENGINEER**

Graduate. About 35 years of age and with 5-10 years of experience in foundry or steel mill plant engineering and maintenance. To serve as an assistant to Plant Engineer in a leading steel foundry in the east. Excellent opportunity, salary and working conditions. Write giving full details in confidence to:

**BOX 603, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**GENERAL FOREMAN**

For nonferrous foundry in Southern California plant of national company. Must have ability to organize and supervise with a minimum of five years' experience in high production nonferrous foundry. Position offers excellent future in rapidly expanding company. Complete benefit program including profit-sharing. Send complete resume including salaries on previous positions, references, and how soon available.

**BOX 605, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

# CLASSIFIED ADVERTISING

## Help Wanted

**FOUNDRY ENGINEER**

A major manufacturing firm, long established in Chicago, has an unusual opportunity for a foundry engineer.

The work will involve assuming responsibility for engineering improvements in foundry units. Applicant must be capable of plant wide planning, equipment selection and layout for efficient modern foundry operations. This is a permanent position and pays a salary commensurate with ability.

In your resume, state education, experience—including size and type of operation and degree of responsibility, and salary expectations.

**BOX 616, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**FOUNDRY METALLURGISTS AND ENGINEERS**

Opportunity is knocking for a gray iron foundry engineer under 40 who

1. Would like complete charge of metallurgy, sand control, and plant engineering with a medium-sized gray iron jobbing foundry beautifully situated in New England.
2. Wants to grow with two young men in developing a well established business into an outstanding foundry.

This is a rare opportunity for a well-trained man to fit into a situation that is challenging, stimulating and rewarding.

**BOX 616, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**METALLURGICAL ENGINEERS**

Key position currently available with established ferro-alloy manufacturer:

> Gray iron metallurgist — foundry experience and strong metallurgical background desirable. Duties include field and development service work, requiring moderate travel.

Salary commensurate with qualifications. Liberal benefits. Advancement opportunity. Relocation paid. Write in confidence to:

**BOX 618, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**INSPECTION AND QUALITY CONTROL**

Man to head Inspection Departments of Foundry and Machine Shop. Should know ferrous casting requirements and be able to maintain quality standards in machined products and commercial castings. Must have growth potential and be capable of handling customer service calls. Prefer man with some metallurgical knowledge. Address: Box 619, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**FOUNDRY ENGINEER**

Challenging position in management engineering for young foundry engineer prepared to travel. Must know gray iron foundry operations, able to make layout drawings. Industrial engineering experience desirable. Reply with photo. Box 613, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**LAYOUT MAN**

For metal pattern shop. Paid vacations and holidays. Steady employment. PROCESS PATTERN & ENGINEERING CO., INC., 1707 N. HARRISON ST., FORT WAYNE, INDIANA.

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**PATTERN SHOP FOREMAN**

For medium size shop in Central Indiana. Address: Box 622, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Help Wanted

**SUPERINTENDENT**

For progressive medium-sized foundry in Texas that makes a wide variety of work including both production and jobbing work. Must be capable of handling production on jolt squeeze and rollover molding machines and floor molding. Foundry of 50 years' experience. Send references and past experience.

**BOX 626, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**MECHANICAL ENGINEER**

Nonferrous foundry and machine shop needs plant engineer, preferably with finished bronze bushing experience, to supervise production in shop and foundry. General foundry experience in sand, permanent mold and centrifugal processes would be to advantage. In reply give age, education and experience. Address: Box 604, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**FOREMAN**

For the night shake-out crew in a gray iron foundry producing castings from 1# to 12,000# in size. Not over 45 years of age. Address: Box 589, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**SUPERINTENDENT**

For nonferrous foundry. Excellent opportunity for man with good educational background and sound practical experience. Address: Box 600, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Positions Wanted

**FOUNDRY SUPERINTENDENT**

Gray and alloyed iron. Progressive and thorough with every phase of foundry operation from purchasing of raw material through production of finished product with extensive background of practical and technical experience. Address: Box 573, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**ENGINEER**

Permanent Mold, Aluminum, 25 years' experience. Permanent or temporary job. Address: **H. C. HAASE, 546 BEVERLY ROAD., TEANECK, N.J.**

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**WORKS MANAGER-SUPERINTENDENT**

Capable of operating a 350 man organization. 23 years of experience in casting ferrous and nonferrous metals in sand, permanent and investment molds profitably. Address: Box 577, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**SUPERINTENDENT OR MANAGER**

Young foundryman thoroughly versed in all gray iron operations. Degree in Metallurgical Engineering. Interested in responsible position with opportunity. Address: Box 596, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**PRACTICAL FOUNDRYMAN**

Thirty years' experience, all phases of foundry operation, 12 years foundry supervision, in gray iron and nonferrous. Light production to medium-heavy jobbing. Address: Box 628, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**PRACTICAL FOUNDRYMAN**

Fifty years old, operated own foundry. Prefer outside, calling on foundries, metals, sand, supplies, equipment or what have you. Located, Ohio. Address: Box 574, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**STEEL FOUNDRY METALLURGIST**

35 years' experience, desire position in the Chicago-Milwaukee area. Extensive background in metallurgy and general foundry practice. Seeking management, metallurgical or sales with progressive organization. Recognized standing in the industry, presently employed. Address: Box 614, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**COREROOM FOREMAN**

36 years of age, 10 years' experience as foreman, iron and steel. Desire job in Ohio or bordering states. Address: Box 621, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**SUPERINTENDENT OR MANAGER**

Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 569, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

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**ALUMINUM MANAGER**

Set-up and currently managing successful thin-wall aluminum sand foundry including shell cores, machining, and heat treating. Young, ambitious, engineering degree. Seek responsibility, challenge, and opportunity. Address: Box 617, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Positions Wanted

**WHAT HAVE YOU**

FOUNDRYMAN 26 YEARS JOB FOUNDRY, GRAY IRON AND NONFERROUS EXPERIENCE. SOME COLLEGE. SOME FOUNDRY TEACHING EXPERIENCE. NOW EMPLOYED. WOULD CONSIDER FOREIGN EMPLOYMENT. ADDRESS: BOX 547, FOUNDRY, PENTON BLDG., CLEVELAND 13, OHIO.

## Representatives Wanted

**SALES REPRESENTATIVES**

To represent well established shell core and shell molding machine manufacturer in United States and elsewhere. Several teritories available in Far West, Southwest and Southern territories. Liberal commission basis for nationally advertised shell machinery.

**BOX 607, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**SALES REPRESENTATIVE WANTED**

Large nonferrous sand foundry in jobbing and semi-production work for over 30 years. Interested in commission salesmen in Illinois, Indiana, Wisconsin and Ohio. Send resume of experience.

**BOX 598, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

## Foundry Consultant

**CONSULTING ENGINEER**
**Thirty-five years' Experience**
**Acid and Basic Practice**

Improved methods in electric furnace melting. Low cost with high productivity. Avoid expensive mistakes. Acquire consultation prior to the purchasing of your new furnace and in planning, modernizing, and organizing of your melt shop.

**EUGENE H. WEAK 2933 HIGHWAY AVE.**
**HIGHLAND, IND. PHONE: TEMPLE 8-1244**

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**FOUNDRY CONSULTANT—NONFERROUS**

Sand—permanent mold—centrifugal permanent mold—and centrifuge permanent mold. High pressure castings a specialty. Address: ED JENKINS, RT. #3, BOX 345, WALKERTON, INDIANA, PHONE: 712W.

## Wanted-To-Buy

**WANTED TO BUY**

Used Dielectric type core oven capable of handling 700 pounds of cores per hour with approximately 3% moisture.

Direct arc melting furnace with 1 ton per hour capacity for ferrous metal.

**BOX 620, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

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**WANTED TO BUY**

Roots-Connersville Blower
7000-8000 C.F.M. Capacity.

**THE EASTERN FOUNDRY CO.**
**BOYERTOWN, PA.**

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**WANTED TO BUY**

One 15 ton Ladle complete with Baile.

**PITTSBURGH STEEL FOUNDRY CORP.**
**P.O. BOX 986**
**PITTSBURGH 30, PENNSYLVANIA**

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**MIXER WANTED**

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

# CLASSIFIED ADVERTISING

## Employment Service

**FOUNDRY PERSONNEL SPECIALISTS**
National Placement and Procurement of

**GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS**

Confidential Inquiries Invited
From Employers and Qualified Applicants
For Fast Competent Assistance Contact

**DRAKE PERSONNEL, INC.** — **HARRISON 7-8600**
**JOHN COPE, DIRECTOR** — **220 SOUTH STATE ST., CHICAGO, ILL.**

## Wanted-To-Buy

**Desire to Purchase**
**GRAY IRON FOUNDRY**

Capable of producing small to medium production castings. Will buy to operate in present location or will buy to dismantle and move. Will also consider buying into a going operation needing capital or desiring expansion. Write giving full details of what you have to offer with price. Address: Box 611, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOUNDRY WANTED**

Interested in purchasing Aluminum and Brass Foundry in New York Metropolitan area grossing $200 000 plus. Will consider partnership. Replies confidential. Address: Box 545, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Foundries For Sale

**FOUNDRY FOR SALE OR RENT**

Ready to operate. Equipped for machine molding. Two cupolas lined to 36" and 30". Also well equipped machine shop. Located in South side Virginia in corner of crossing Atlantic and Danville Railroad and main line of Atlantic Coast Line Railroad. One block from U.S. Highway 301 and U.S. Highway 58. Address: BOX 551, EMPORIA, VA.

**FOR SALE**

Small aluminum and bronze foundry business in southwestern Pennsylvania. Steady casting for other corporations. Owner retiring. Address: Box 602, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Opportunity

**PERMANENT MOLD METHOD AVAILABLE THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California,** has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

## For Sale

**WANTED FOR CASH**

Turn your surplus new motor inventory into quick cash! Sell your surplus new motors to Ajax Electric Motor Corp.

**MOTORS AVAILABLE — NEVER USED**

Shipped from stock of over 5,000.
¼ to 200 HP—Special Low Prices.

**WRITE, WIRE OR PHONE COLLECT!**

**AJAX ELECTRIC MOTOR CORP.**
**P.O. BOX 262, ROCHESTER, N.Y.**
**LONG DISTANCE PHONE LD. 132**

## For Sale

**SAND BLAST EQUIPMENT**
**SELL — BUY — TRADE**
**GUARANTEED MACHINES**
**TERMS: 3 YEARS TO PAY**

Pangborn E.S. 347 Conveyor Cabinet, 4 throwing wheels, used for blasting motor blocks, a beauty, can be seen in operation. $9,000 FOB Det.

| | |
|---|---|
| Pangborn 14 GK Rocker Barrel | $2.500.00 |
| 9' LG-14 Pangborn Table | 4.500.00 |
| 6' LG-14 Pangborn Table | 3.000.00 |
| 6' LE Pangborn Air Table | 800.00 |
| 48 x 48 Wheelabrator TumBlast | 5.000.00 |
| 42 x 48 Wheelabrator TumBlast | 2.500.00 |
| 26 x 42 Wheelabrator TumBlast | 2.000.00 |
| 27 x 36 Wheelabrator TumBlast | 2.750.00 |
| 15" Continuous Wheelabrator TumBlast | 2.000.00 |
| 8' Wheelabrator Table Blast | 2.000.00 |
| 6' Wheelabrator Table Blast | 3.000.00 |
| 4' Wheelabrator Table Blast | 2,500.00 |

Vapor Blast Cabinets, singles and doubles.

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

**DIAMOND SALES, INC.**
**5654 W. JEFFERSON**
**DETROIT 9, MICHIGAN**
**VI-36750**

**We Will Buy One Piece Or Your Entire Plant**

**X-RAY UNIT**

Picker Co. style 561, including lead room lining. Also 2 Newaygo power riddles, post type. Gardner disc grinder. Magnetic separator. Other foundry and machine shop equipment.

**BECKETT BRONZE COMPANY**
**MUNCIE, INDIANA**

**FOR SALE**

Lectromelt 250 lb. type "U" side charge electric furnace. Complete, good condition.

**BEAVER VALLEY ALLOY FOUNDRY CO.**
**MONACA, PENNSYLVANIA**

**FOR SALE**

One (1) Pangborn LG Roto-Blasting Machine 9'-14 with one (1) roto-blast wheel and drive. Air capacity 4400 cfm. Equipped with #623 type CH cloth screen dust collector 5' long providing 1620 sq. ft. of area. Also one (1) #8 KX Exhauster-capacity 4840 cfm. Generally in accordance with Manufacturers' Bulletin 909-A. Machine was used very little and is in excellent condition. May be seen at our Pottstown, Pennsylvania, Plant. Bargain for anyone who can use it. Reasonable offer invited. Address: DOEHLER-JARVIS DIVISION, NATIONAL LEAD COMPANY, TOLEDO 1, OHIO.

**FOR SALE**

Pangborn #7 Type GK2 Rotoblast Barrel, 220/3/60. Address: Box 606, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## For Sale

**FURNACES AND OVENS**

Lindberg Super Cyclone Furnace, 48" x 72", excellent condition.
Tempering Furnace, continuous mesh belt, gas fired recirculating.
Copper Brazing Furnaces, mesh belt, roller hearths. Guaranteed.
WANTED: Used Ipsen, Dow, Lindberg, and Holcroft Heat Treating Furnaces.

**METAL TREATING EQUIPMENT**
**9825 Greeley** — **Detroit 11, Mich.**
**TOwnsend 8-8450**

**FOR SALE**

1—Coleman, external recirculating mold or core drying batch oven. Outside dimensions: 16'4" wide x 20'8" long x 10'6" high, execlusive of recirculation furnace.

Door opening one end, 14'0" wide x 9'6" high. Rockwool insulation in walls, roof and door complete with:
1—motor driven car, 12'0" wide x 18'0" long. External recirculation system located on top of oven.
1—Clarage recirculating fan.
1—Clarage exhaust fan.
Gas fired with automatic temperature controls with safety equipment. Price $4800.00 f.o.b. Milwaukee, Wisconsin.

**CRUCIBLE STEEL CASTING COMPANY**
**2850 SOUTH 20TH STREET**
**MILWAUKEE 15, WISCONSIN**

**FOR SALE**

2—Osborn 710-PV Pin-Lift Molding Machines, Serial numbers 12488A and 12339A.
1—Spencer Turbo—16 oz.—635CFM Compressor Blower.
1—Robinson Blower—Type CB—12 oz., 220V—10 H.P.
2—Silent Glow Portable Oil Heaters, Model E.

**RANDALL GRAPHITE BEARINGS, INC.**
**GREENLAWN AND LAKE STREETS**
**LIMA, OHIO**

**FOR SALE**

730 Ft.—20" wide roller conveyor. 3" roller on 4" center. 4 x 3 x ⅜ angle frame. High set. Unused.

**ARECO, INC.**
**1851 S. BLUE ISLAND AVE.**
**CHICAGO 8, ILLINOIS**

**FOR SALE**
**MOTORS—GENERATORS**
**TRANSFORMERS**
Unused — Rebuilt
WORLD'S LARGEST INVENTORY

**ELECTRIC EQUIPMENT COMPANY**
Phone Station Collect GLenwood 3-6783
P.O. Box 51—Rochester 1, New York

**BLOWERS FOR SALE**

Spencer—No. Amer.—Stroman
Capacities from 60 to 4500 CFM at 2, 12, 16 and 24 ounces.
Motors for 110/60, 220/440/3/25 and 60 cycle and 230 volt DC.
Let us quote on your requirements!

**R. C. CHELIUS**
**31 PALMER AVE.**
**KENMORE, BUFFALO 17, N. Y.**

**FURNACES FOR SALE**

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

**MOLDING MACHINE**

Herman 6000# capacity, jolt-roll-draw in operating condition. Asking $2900 f.o.b. Address: POTTSTOWN MACHINE CO., POTTSTOWN, PA. (Phone 37, H. H. Houston).

**FOR SALE**

American Model "M" Sand Cutter, type 79/60, serial No. 105. Address: THE PARKER-STREET CASTINGS COMPANY, CLEVELAND 25, OHIO, PHONE: MI 1-5350.

# CLASSIFIED ADVERTISING

## For Sale

**FOR SALE**

1 Johnston & Jennings 1020 B Jolt Rollover with Hyd. Head. excellent condition
1 Herman Jolt Stripper 48 x 54
1 Tabor Shockless Jar Rollover, power draw, table 30 x 40, 12" draw, 1000 lb. cap.
3 Tabor shockless jar rollover, power draw, table 22 x 42, 600 lb. cap.
1 Osborn Jolt Rollover, hand clamp, 30 x 40
1 J & J Rollover #819 with rollout table.
1 Int. Rollover Table 30 x 26, 8" draw.
2 Int. Rollovers, Portable
1 Davenport #28 SA Jolt Rollover, Pattern Draw.
2 Champion Model J8-10S Jolt Squeezers
1 Int. Plain Jolt 36 x 48
3 Milwaukee Squeezers, Stationary
2 Int. Squeezers, Portable
1 Nichols Plain Molding Machine, High Speed.
6 Arcade Model 100S Jolt Squeezers, Stationary
1 Int. Core Blower, SB 13
1 Int. Core Blower, SB 11
1 Champion Core Blower, CB 18
1 Demmler Core Blower, Style 1
1 Demmler Core Blower, Style 2
2 Porbeck Core Ovens, 6½' x 6½' x 9', raising door
2 Core Ovens, Drawer type
2 Simplicity Screenarators
2 Sand Mixers, paddle type
Pouring devices up to 2,000 lb.
5 Pouring Ladles, cylindrical, 26 x 28, geared Gyratory Riddles
Monorail and Bridges
Air Hoists, 500 to 4000 pounds, used
Air Hoists, 2000 lbs and 4000 pounds, never used, still in original crates. Big Savings
1 Chain Conveyor #458, Trolleys and Drives.
Dust Collectors, all sizes
Blowers, all sizes, Pressure & Exhaust.
FLASKS—THOUSANDS IN STOCK, ALL SIZES

**MANY OTHER ITEMS IN STOCK**
**SEND US YOUR INQUIRIES**
**WE BUY — SELL — TRADE**

**HOMAN MACHINERY CO.**
**710 E. FRONT ST.**
**CINCINNATI, OHIO**
**MAin 1-0339**

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**FOR SALE**

Leitz Panhot Metallographic Microscope complete with objectives and eyepieces, camera attachment transformer. Includes low speed polisher and specimen mount press. Also includes complete darkroom equipment. Used only three times—in "like new" condition. Private owner. For complete listing of equipment, Address: Box 601, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## For Sale

**SPEEDSLINGERS FOR SALE**

Two stationary Speedslingers. 12 ft. and 7 ft. 6 In. arms, 22 In. discharge heads, 60 HP Ramming Motors. Includes 30 ton sand bins and Jeffrey Apron Feeders. Available for inspection IN USE through June. Available for shipment in July.

**PITTSBURGH STEEL FOUNDRY CORP.**
**P.O. Box 986**
**PHONE: Purchasing Department—Glassport, Pa. North 4-7141**

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**FOR SALE**

2—Reda Tilt Furnaces, 400 series, Combination Oil, Gas Fired.
1—2 Burner Gas Ladle Drier-Hauck No. 2-E-4.
7—Roto-Cast Revolving Mold Conveyors—10'.
1—Milwaukee-Tessmer Sprue Cutter. Model H with air operated foot trip. 3 H.P., 220, 3-60 motor.

**THE UNION MALLEABLE MFG. COMPANY**
**ASHLAND, OHIO**

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**EQUIPMENT FOR SALE**

1—Laboratory Combs Gyratory Sand Riddle
1—Marschke Swing Grinder, 3 H.P., 2x12" wheel
2—Beardsley Piper Ramming Units 19" heads with 25 H.P. motors
1—lot steel flask equipment (Sterling and others) good condition, various sizes - 7c pound

**ST. LOUIS STEEL CASTING, INC.**
**100 MOTT STREET**
**ST. LOUIS 11, MISSOURI**

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**FOR SALE**
**BAKER-PERKINS CORE-SAND MIXER**

- Size 16½ DIM
- 25 cu. ft. capacity
- 30 HP motor and drive
- Excellent Condition.

Priced to Sell.

**MACHINERY & EQUIPMENT CO., INC.**
**514 BRYANT STREET**
**SAN FRANCISCO, CALIFORNIA**
**TEL. GArfield 1-1380**

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**WILL TRADE**

Foundry equipment for complete operation, including molding machines, core equipment, sand handling equipment, etc. All equipment dismantled and in storage. Interested in trading for income producing Real Estate.

**BOX 629, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

## For Sale

**GUARANTEED MACHINES AT LOWEST PRICES**

MOLDING MACHINES
213 SPO; 4½" jolt; 13" squeeze
2114 SPO—11" sq.
2136 SPO—13" sq.
720 U Osborn—11" sq.
International PKL—14 x 5½"
Tabor—30" x 40"; 12" draw; shockless—1000#
2047 Osborn—18" x 24"; stationary
601—602—605 Osborns
Milwaukee Jolt Squeezers; 16 x 20; 4½" jolt
275 J Osborn Squeezers
113 J SPO Squeezers
CORE BLOWERS
Redford—Bench type
#193 Osborn—for medium cores
#94 Osborn—for large cores
FURNACES
2000 lb. Stroman—Tilting Hydraulic
2000 lb. Fisher—Aluminum
350 lb. Detroit Rocker Barrel
CORE OVENS
Dielectric—Model 900A and 1800A
MISCELLANEOUS
20" x 27" American Wheelabrator
Fork Lift Trucks—2000# to 15000# cap.
U.S. 7½ HP 3 speed grinders; 28" wheel
Model S Screenerators—B & P
Climax Wire Straightener
Model AA American Sandcutter
Jib Cranes—2 ton cap.
Electric Hoists—2 ton cap.
#42 Osborn Hand Rollovers

FOR THE BEST DEAL CALL
**BALCHER MACHINERY COMPANY**
**695 E. 152ND STREET**
**CLEVELAND 10, OHIO**
**TELEPHONE: GLENVILLE 1-2474**

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**REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS**

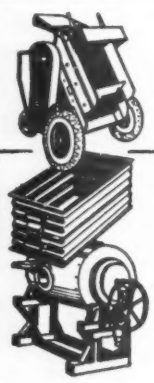
We try to keep on hand a stock of **"Hard Chrome Rebuilt Foundry Tools"** such as Rammers, Chipping Hammers and Core Breakers. Our prices are about **One-half** the cost of new tools. All tools sold by us are guaranteed and can be returned if not found satisfactory.

**CENTRAL PNEUMATIC SERVICE COMPANY**
**512 LINDEN AVENUE**
**DAYTON 3, OHIO**

---

**FOR SALE**

Core plates, surplus, 10 x 10, 12 x 12, 14 x 12, 12/13 x 25, 14 x 26/27, 20 x 20, F.O.B. Columbus, Ohio, 15c lb. Address: INDUSTRIAL ALUMINUM FOUNDRY, 660 ST. CLAIR AVE., COLUMBUS, OHIO.



# EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

**14919 SARANAC ROAD** **CLEVELAND 10, OHIO**

**OSBORN ROLLOVERS:**

5—405 rollovers and pattern draw 18 to 26" draw, air clamps, 3500 lbs. capacity.

**TUMBLING MILLS:**

1—60" x 72" Ransohoff tumbling type wet cleaning mill, 220/440/3/60
1—36" x 54" Royersford

**SWING GRINDERS:**

10—10 H. P. Mummert Dixon Model 1814, 220/440/3/60/1800

**MAGNESIUM CLEANING CABINETS:**

6—Whirlpool Duplex, 800 CFM, 100" wide x 65" deep x 90" high. Buffalo exhausters—7½ HP., 220/440

**ASK FOR OUR COMPLETE LISTING!!**

**ELECTRIC FURNACES:**

1—250 lb. Detroit Rocking
1—350 lb. Detroit Rocking

**GLENVILLE 1-1222**

# PUBLIC AUCTION SALE

## SURPLUS ULTRA-MODERN FOUNDRY EQUIPMENT; CLEANING, FINISHING & TOOL ROOM MACHINERY

**By Order of**

## THE YALE & TOWNE MANUFACTURING CO.

**EAST GATE, CANAL STREET, STAMFORD, CONN.**

## SALE DATE: THURS., JUNE 20, '57

**at 10:30 A.M. (DST) Inspection from June 17**

**SHELL MOLDING DEPARTMENT** — INSTALLED NEW 1955—Cost over $150,000: (1) "Shell Process" 20″ x 30″ plate size automatic two station shell molding machine; (3) "Shell Process" automatic single station shell molding machines; (12) "Shell Process" automatic shell bonding machines; (2) SPO SC10DM shell core blowers; (1) SC20DM shell core blower; shell mold pallet conveyor 458 chain; shell sand blender, conveyors and raw material storage bins.

**CLEANING ROOM:** (2) 42″ x 48″ "AMERICAN" Wheelabrators—late models; (1) 27″ x 36″ American Wheelabrator; (1) 84″ American swing out table—late type; (1) American tablast 8-24″ dia. tables; Leiman reach in cabinet; Pangborn rotary blast barrel; Ransohoff wet type tumbling mill; (6) wet type barrels-geared head drives; (8) D.E. snag grinders—Hammond and Norton; dust collectors; (4) tumbling mills; Tessmer sprue cutter; Tabor abrasive cut-off; metal cutting band saw.

**HEAT TREATING DEPARTMENT:** Electric 180 KW annealing furnace, car tunnel type, complete Heat Treat Department, pit type furnaces.

**MACHINE TOOLS:** Lathes—Monarch, Hendey, Lodge & Shipley, Hardinge and LeBlond to 16″ x 78″; Milling Machines — Bridgeport, Reed Prentice and Cincinnati; Grinders and Shapers —#2 Brown & Sharpe surface, 20″ Rockford hydraulic, 12″ Potter & Johnston; Assorted Sheet Metal Machinery, 10 x 10 Peerless, Tabor cutoff, 3″ bar #32 Giddings & Lewis boring mill; assorted woodworking machinery.

**MATERIAL HANDLING EQUIPMENT:** (13) Yale fork and platform lift trucks; battery chargers (25) ¼ to 3 ton Yale hoists; overhead monorail; 4000 tote pans; casting boxes, carts.

**MELTING DEPARTMENT:** (2) Whiting #6 cupolas, individual Foxboro controls, wishbone charge buckets, Whiting-Spencer cupola blower, holding ladle, pouring ladles, pouring devices, (5) brass melting furnaces.

**MISCELLANEOUS:** Shakeouts, belt conveyors, laboratory and test equipment.

**MOLDING MACHINES:** (26) Osborn 275PJ portable jolt squeezers; (4) Osborn jolt squeeze pin lifts; (3) Osborn 712 jolt squeeze pin lifts; (2) SPO 506 jolt rollover draws, Tabor, Johnston & Jennings and International rollovers.

**MULLERS:** (5) #2 Simpson mullers—some with skip loaders; (3) Royer sand cutters.

**RAW MATERIAL AND SUPPLIES:** Scrap; pig iron; firebrick; core oil, foundry compounds and supplies, chaplets, etc.

**SAND SYSTEM:** 30 station molders overhead sand system, (2) #2 Simpson mullers, (2) bucket elevators, shakeout, sand return conveyor, rotary sand screen and hoppers.

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# AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

## AIR COMPRESSORS
1—CHICAGO PNEU., 160 CFM, 30 HP.

## AIR & ELECTRIC HOISTS
85—INGERSOLL RAND Air Hoists, Sizes RC-5, A, B, C, D, ¼, ½, 1, 2 ton.
15—DETROIT Air Hoists, 1 & 1½ ton cap.
15—APPLETON Air Hose Reels.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.

## BUCKET ELEVATORS
2—LINK BELT 35 ft. & 50 ft., 12" x 7" Buckets.
2—NATIONAL 45' & 50', 10" x 7" & 14" x 7" Buckets.

## CUT-OFF MACHINES
1—DeWALT ME2, 10 HP, 24" Blade.
1—GROB Band Saw, Type OS-36.
3—TESSEMER H & I Sprue Cutters.

## CORE BLOWERS
3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLERS Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 192, & 193. From 10 lb. to 75 lb. Cores.
8—REDFORD & MILWAUKEE Bench.

## CORE OVENS
4—CARL MAYER 2-Compartment, gas fired, I.D. 7' W x 14' deep x 8' H each.
1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
2—PORBECK Model C-3-C, Double Drawer Type. Gas fired, new in 1955.

## CUPOLA BLOWERS & EQUIP.
1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates & controllers.
1—ROOTS 7 000 CFM, 50 HP motor.
14—LINDBERGS. From 1 HP to 15 HP, 160 to 2100 CFM.

## ROTO-CLONES WET TYPE
9—AMERICAN AIR FILTER Type N&W, Sizes No. 10, 14, 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

## ELECTRIC MELTING FURNACES
1—DETROIT ROCKER TYPE AA, 1000 lbs. cap. with 350 KVA Transformer.
1—AJAX 20 KW Induction Unit.
1—TOCCO 20 KW Induction Unit.
3—AJAX No. 300 & 500 Furnaces Only.

## GAS & OIL FIRED FURNACES
23—LINDBERG FISHER Model MNP Electric Tilting. Sizes 150, 300, 400, 600, 1700, 2000 & 2400#, aluminum capacities, Gas or Oil Fired. With Motors & Blowers.
5—LINDBERG FISHER Type BBI Hand Tilting Furnaces, Sizes 100, 125, 225, & 1000. With Gas or Oil Fired. With Motors & Blowers.
29—LINDBERG FISHER & CAMPBELL HAUSFELD Stationary, Sizes 100, 150, 200, & 550 capacity. Gas or Oil Fired, with motor & blowers.

## GRINDERS
**Swing Frame**
1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.
**Snagging**
2—U.S. #64, 20" x 3" wheel 7½ HP.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
**Disc**
1—QUEEN CITY Model 100 20" x 2" wheel.
1—U.S. #80, 16" x 3" wheel, 7½ HP.
**Core**
2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder, 16" dia. Wheel.

## LADLES
17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
12—MODERN Model F-9 and FA-9 Pouring Devices, with ladles 400 to 800 lbs.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000, & 80,000 lbs. capacity.
7—MODERN & WHITING Cylindrical Mixing Ladles. 2 & 3 ton capacities. Electric & Manual Tilting.
7—WHITING Bottom Pour 4 ton.

## MOLDING MACHINES
**Jolt Squeezers**
37—OSBORN, SPO, MILWAUKEE, Portable & Stationary. 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.
6—MILWAUKEE 18" Cyl., 24" x 36" Table.
**Plain Jolt**
1—HERMAN 40" x 70" table, 6000# cap.
1—HERMAN 40" x 58" table, 6000# cap.
1—DAVENPORT 24AJ, 24" x 30" table.
1—HERMAN 8' x 12' table, 32,000# cap.

### MUST SACRIFICE!
General Electric 50 ton air conditioner, Model 19CM123G-581C type CM 124G, complete with cooling coil bank, oil filter bank, 50 HP Freon compressor and miscellaneous copper tubing. Unit complete and in like new condition. Replacement value $19,000.

**Jolt Rollover Pattern Draw**
1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
1—HERMAN 6000 lb. Series, 42" x 78".
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Table Sizes 20" x 8", 24" x 10", 30" x 12".
1—INTERNATIONAL RES Size 15" x 8".
2—J & J #612, 24" x 30" Table.
4—J & J #918, 44" x 54" Table.
1—J & J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
1—MILWAUKEE #217, 35" x 41" Table.
1—MILWAUKEE #60B-3, 60" Flask.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" Draw, 750 lbs. Cap.
1—SPO #413D, 24" x 25" Table.
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 32" Table, 10" Draw.
**Jolt Pin Lift**
2—DAVENPORT 24-AJS, 24" x 30" Table.
2—OSBORN #559, 25" x 30" Table.
1—OSBORN #560, 32" x 45" Table.
1—OSBORN #563, 55" x 63" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
1—SPO #3102—42" x 50" table.
**Pin Lift**
9—INTERNATIONAL & B & P Speed Draw Machines. Used with Sand Slinger. Capacity from 600 to 2000 lbs., up to 30" x 40" flasks.
**Jolt Squeeze Pin Lift**
1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE #165, 24" x 30" table.
1—OSBORN #716-PJ, 22" x 34" Table.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
4—INTERNATIONAL PKL, 17" x 26" Table.
1—SPO #2114, 20" x 27" Table.
2—SPO #2136-G, 19" x 26" Table.
1—SPO #2146, 21" x 27" Table.

## MATERIAL HANDLING EQUIPMENT
1—EC&M 45" dia. Type SA, Magnet.
3—HOUGH Model HA Payloader, hyd.
1—BLAW-KNOX ½ yd. Bucket.

## CONVEYORS
**Steel Apron**
9—JEFFREY & LINK BELT 24", 30", 36", 42", & 48" Widths. Length built to your specifications, with reducers & motors to your speed requirements.
**Oscillating**
3—SIMPLICITY Model OA-10-A, 36" x 15'.
1—LINK BELT 48" x 154', 20 HP Motor.
4—LINK BELT 30" W x 45', 65' & 80' lengths.
1—ROBINS Vibra-Veyor 24"W x 100' long x 8" deep pan. New 1953, like new.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7' long, total unit 24" W x 49' long, w/MG set. New 1949.
**Roller**
2500' MATHEWS 6", 22", 24" & 30" wide. Heavy duty, 2⅞" dia. roller, 1¼" hex shaft on 3" & 4" centers. Mounted above rail on 4" channel iron.
**Mold**
1—LINK BELT 36 cars 4' x 5', 190' track, with automatic dump. New 1952.
3—LINK BELT 88 Cars 20" x 48", 350' track, with automatic dumping.
**Belt**
LINK BELT & JEFFREY 18", 24", & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & ploughs.

## MOLDERS HOPPERS & STORAGE BINS
7—NATIONAL & LINK BELT Storage Bins, 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap.

## SAND MULLERS
1—B & P No. 60 Speed Muller.
1—B & P No. 3½ Mulbaro, 350# cap.
1—B & P #7 Mulbaro, 700 lb. cap.
2—B & P #70 Air Cooled, Speed Muller.
1—BAKER PERKINS #16½, 30 HP.
1—CLEARFIELD No. 920, 25 to 30 cu. ft. cap.
2—CLEARFIELD No. 610 w/skip hoist loaders, 10 to 14 cu. ft. batch.
1—DRAVO-DOYLE 6 cu. ft. cap. Port.
1—LINK BELT 48" x 8' Paddle Type.
2—SIMPSON #1 Style B, 400 lb.
3—SIMPSON #3 Style C, 3000 lb.
1—SIMPSON #2 Style C, 1500 lb.
3—SIMPSON #3 Style UD, 3000 lb.
1—SIMPSON #0 Style B, 175 lb.
1—SIMPSON #1 Style UD, 500 lb.
1—SIMPSON No. 1½ style UD w/loader

## SAND PREPARATORS
2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS.
6—AMERICAN Sand Cutters, Model M, Sizes 70/60, 80/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.

## SANDSLINGERS
1—B & P Motive Jr., 300 cu. ft. tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slinger, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
1—B & P 2 ton plate feeder.
4—B & P 8 ton plate feeders.

## SHAKEOUTS & SCREENS
2—LINK BELT 5' x 10', 6 ton cap.
1—SIMPLICITY 3' x 5' Model B, 5000#.
1—ROBBINS 8' x 10' Model JF-11 Dual, 16 tons per unit.
1—ROBBINS 3' x 5' portable.
1—SIMPLICITY 4' x 10', Model D.
1—SIMPLICITY 6' x 8', Model DE.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex. Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, single deck sifter screen, 10 HP motors.

## SAND BLAST EQUIPMENT
1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7—14" tables.
2—AMERICAN 36" x 42", w/Skip Hoist.
2—AMERICAN 48" x 42", w/Skip Hoist.
1—PANGBORN 9LF-14—9' dia. Plain Table w/two Roto-Blast units and CH-2 Dust Collector. 4850 CFM. New 1951.
1—PANGBORN #45, type MT Sand Blast Room, 10' L x 8" W x 6' H, w/8" dia. Rotating Table.

## TUMBLING BARRELS
13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes 30" x 60", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120".

# AAA MACHINERY & EQUIPMENT CO.

15539 SARANAC ROAD—CLEVELAND 10, OHIO—CALL LI. 1-6545

# UNIVERSAL REBUILT EQUIPMENT GUARANTEED

## AIR COMPRESSORS

COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

## BLOWERS

25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure and Cent. Cupola Blowers

## CLEANING EQUIPMENT & TUMBLING BARRELS

1—AMERICAN WHEELABRATOR TUMBLAST, 48" x 48" w/loader used 9 Mos.
1—AMERICAN WHEELABRATOR TUMBLAST, 42" x 48" w/loader
1—15" Continuous AMERICAN TUMBLAST, 4 tons per hour capacity
1—AMERICAN WHEELABRATOR, 36", Continuous Side Discharge, Two Head, Serial #A95643, New 1953, Used 2 Months
1—PANGBORN TABLAST, 8' Table
3—TANNEWITZ METAL CUTTING BANDSAWS, 30" and 42"
4—BURRING BENCHES, Magnesium cleaning, 9' L x 30" H x 30" W
1—AMERICAN #1 MULTITABLE TABLAST, 17" Table
10—WHITING 36" x 36" x 72" w/gear head motors & brakes
1—WHITING 36" x 72" Round w/gear head motors & brakes
1—SLY, Twin Unit, 40" x 24" Round, 10 HP
1—SLY, 68" x 32" Round

## CONVEYORS

1—LINK BELT, vibrating, double deck, 80' x 24". w/exhaust hood
1—LINK BELT, Car type mold, 114 cars, 403' track, car size 18" x 42"
2—LINK BELT, 30" Steel Apron Conveyors, 100' Centers
1—JEFFERY, 3 compartment, ingot mold
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES

## CORE BLOWERS

1—CHAMPION CB-12
3—INTERNATIONAL SB-13
12—DEMMLER #1, #2, #2A, #2K, #3K, #4E, #55
4—OSBORN, #91, #92, #192, #91-10
1—TACCONE #4D, 10" Draw Stroke Cylinders

## CUPOLAS

1—MORRIS #9, Skip charger, Blower, Mixing Ladle, Never Installed
1—SKIP CHARGER for #9 Cupola with scale and buckets
2—TABOR Cupolettes, 48" dia, 9" cap.
1—WHITING Skip Charger for #5 Cupola
1—WHITING #4, w/charger & blower, Foxboro Control
1—WHITING #7 w/Skip Charger, Blower, and Foxboro Control

## DUST COLLECTORS

9—ROTOCLONE #12 Type N, #14D, #16W, #20D, Type W 30"

## FLASKS

150 HINES AND FREEMAN ALUMINUM, Popoffs and Jackets
200 TRANSITE CORE PLATES, Various sizes
SEND US YOUR REQUIREMENTS

## FURNACES—DIRECT ARC MELTING

1—250 Lb. LECTROMELT, Side Charge
1—3,000 #/hr. LECTROMELT
1—6 Ton HEROULT
1—2 ton AJAX

## FURNACES—INDIRECT ARC

1—350 #/hr. DETROIT, Complete
1—1500 # DETROIT ROCKER, Complete
1—3000 # DETROIT ROCKER, Complete

## FURNACES—INDUCTION MELTING

1—3 KW, AJAX, Lab type
1—20 KW, AJAX SPARK GAP, High Frequency

**TO BE SOLD AT ANY PRICE GIVE US AN OFFER**

**Pangborn Continuous Shot Blast Machine**

**REPLACEMENT COST OVER $75,000.**

5 Wheel Type each wheel driven by 20 Hp AC Motor. Pendulum type #458 chain conveyor for pick up and return, w/motor driven screw type conveyor for shot return to bucket elevator. Complete w/all controls and switches. Serial 51997391. Large lot of new spare parts.

**CALL US COLLECT TODAY!**

## FURNACES—GAS & OIL

1—FISHER MNP, Gas, Tilting, 1700 # cap. Mag.
2—FISHER, Gas, Stationary, 4 Burner, 500 # cap.
1—FISHER MNP, Oil, Tilting, with blower, 500 # cap. Alum.
1—FISHER MNP, Oil, with blower, 1500 # cap. Brass
1—HAUSFELD, Tilting, 1200 # capacity
1—STROMAN, Gas, Tilting, 1,000 # cap. Alum, auto control hyd. lift
1—REDA 550 #. Never Used

## GRINDERS

1—GARDNER 12" x 2½" wheels, 5HP
1—HISEY WOLF, Model 4, 16" x 2" wheels, 7½ HP
3—U.S. Model 64, 14" x 2" wheels, 5 HP
1—U.S. Model 66, 14" x 3" wheels, 7½ HP
1—U.S. Model 65, 20" x 3" wheels, 10 HP Swing Frame
1—MUMMERT DIXON, 16" x 2" wheel, 7½ HP
4—22" wheels, 10 or 15 HP
1—CINCINNATI, 5 HP, 2/60/110

## MOLDING MACHINES

### Core Rollovers

1—INTERNATIONAL, Type AN, 3500 # Cap., 40" x 20" Table

### Jolt Rollover Pattern Draw

2—J & J #918, 44 x 54 Table, 20" draw
2—J & J #815, 30" x 40", 15" draw, 1200 # jolt
2—INTERNATIONAL, 13" x 17" table, 6" draw
1—HERMAN 10,000 #, 48" x 109" table
1—HERMAN 6000 #, 50" x 72"
1—HERMAN 3000 #, 30" x 66" Table
2—HERMAN 1500 #
1—HERMAN 750 #, 30" x 36"
2—OSBORN #602, 36" x 26", 900 #
1—OSBORN #405, 3000 #, flask size 64" x 50", 18" draw
3—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000 # capacity
1—TABOR, 30" x 40" w/air clamps, 1000 #
3—TABOR 22" x 42", pattern draw, shockless, portable
1—TABOR, 20" x 30" w/air clamps, 1000 #
2—TABOR, 14" x 16" Rockover

### Bumpers

2—DAVENPORT, Table sizes 24" x 27", 30" x 30"

### Jolt Pin Lift

1—J & J #681-C, 30" x 25" table, 600 # cap.
2—SPO #305, 20" x 27" table, 750 # cap.
1—HERMAN, 22" x 30" table, #4317
1—TABOR, 17" x 20" table, portable
1—TABOR, 20" x 20" table, hand strip
1—TABOR, 20" x 24" Table, 600 #
1—MILWAUKEE #1536, 32" x 38", 1500 #
1—OSBORN #559, 25" x 30" table, 6" draw, 1200 #

### Jolt Squeeze Pin Lift

2—OSBORN #712, 18" x 28" table, 12" Sq.
4—SPO #2114P, 21" x 27" Table
1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200 #
2—MILWAUKEE #163 15" x 24" table, 11" sq.

### Jolt Squeezers

2—MILWAUKEE #104-5JS, 17" x 21", port.
3—SPO #110J, 17" x 20" table, 10" sq.
4—INTERNATIONAL #10 LJS, 17" x 20"
2—INTERNATIONAL, #12 LJS, 17" x 20" table, stationary and portable
6—TABOR, 3" Jolt, 17x 20"
1—NICHOLS #12 F-P, portable, 600 #
12—OSBORN #275J, #275PJ, 16" x 20" tables, 10" sq., 400 #
2—INTERNATIONAL, PKL, 18" x 24" Table, 12" Sq.

## MATERIAL HANDLING

1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—Electric Magnet, 47" x 47", 20" deep
1—CLARK, Fork Lift, Gas, 3000 lb. capacity, Solid Tire

## MULLERS AND MIXERS

1—CLEARFIELD, #920, 9' Dia., 25-30 cu. ft.
2—SIMPSON, #0, 3' Dia. 175 lbs. Style M
1—SIMPSON, #3, 8' Dia. Open Gear, with loader 20-25 cu. ft. batch
1—SIMPSON #1, 4' dia., 4 cu. ft. batch, 2 wheels, Style UD, w/loader and dust hood
1—B & P Mulbaro, #3½
1—B & P, Conventional, SIMPSON type, 87½" Dia., arranged for cooling
2—LANCASTER Mixers, #4, 5' Dia. Pan, 3-9 cu. ft. cap.

## LADLES AND POURING DEVICES

MODERN, SWINDELL, WHITING, TREADWELL—All Types and Sizes—Ready for your Needs!

## OVENS

1—COLEMAN, OIL, one compartment, recirc., 60" W x 80" H x 14' 6" L
1—COLEMAN, Gas, 2 Comp. and 5 drawers, O.D. 22' x 12' x 10'
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½" x 14' x 7'
3—GENRICH, elec., 3 drawer, preheating, auto-control, 9' H x 8' W x 6'7" L

## SAND CONDITIONING

1—ROYER SCRAP CONTROL, Model S-522-9M, 60 tons/hour capacity
1—ROYER PREPARATOR, Comb. Model NDC, 25 Ton/hr. Scrap removal, 8' x 8' hopper
1—ROYER, NB-2, Portable, 7-10 tons/hr. cap.
1—B&P Screenerator, Model M
1—HANDY - SANDY & REDDY - SANDY UNIT—Excellent Buy!

## SAND CUTTERS

1—AMERICAN, 15 HP, 60" Reel, 56" Wheel
1—AMERICAN SANDMASTER, 70" x 104", Rubber tires, Very Late Model
1—MOULDERS' FRIEND, 60" Blade

## MISCELLANEOUS

1—WHITING #3 PULVERIZER, Brand New, w/10 HP G.E. Motor
1—NATIONAL ENGINEERING SAND-PREPARATOR Unit w/permanent magnet pulley
1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER, Model DX-5

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# THE ACME BARGAIN PAGE

## BLOWERS

Ingersoll-Rand Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220V G. E. Induction motor. General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor, Airway controls.
Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.
1—Whiting-Allis Chalmers Turbo. 5750 CFM 28 oz. 60 HP 440V air pressure Controls.

## CONVEYORS, VIBRATING

36" x 162' Oscillating Pan Link Belt
30" x 53' Oscillating Pan Link Belt

## CORE BLOWERS

3—International SB 12.
4—International SB 13.
6—Osborn 193.
1—Osborn 2035-2.
1—Champion CB 400.
1—Champion CB 15
2—CB 10 Late Type.
1—3E Demmler Drop Away Draw.
1—No. 4 Demmler.
1—Redford Bench Type.

## CORE GRINDERS

3—Milwaukee 70-9.

## CORE OVENS

Despatch Type S, 2 cars 27½ x 54 x 64, Gas Fired.
2—Thermonic 900A-1800A.

## CORE OVEN VERTICAL HORIZONTAL

1—Coleman, combination oil or gas fired 43 carriers 24" x 90" —1 hour 12 min. to 4 hours 48 min. cycle.
1—Coleman combination oil or gas fired 43—2 shelf carriers 30" x 144" long. 2 hour 12 min. to 7 hour 24 min. cycle. Present replacement cost over $90,000.

## CORE PASTE OVENS

2—Coleman Gas Fired 28'-25" x 42" opening.

## NORMALIZING OVEN

Despatch DT 36 Electric—Pit type, 42" x 40" baskets, 220V.

## DUST COLLECTORS

Rotocione 24W, 30 HP.

## ELECTRIC CRANE & RUNWAY

270' x 50' Crane Runway with A Frame supports and 2 cranes.
1—P & H 5 Ton OET Crane, 3 motor, 115V D.C., outdoor type, 45' lift with reel for magnet or bucket service.
1—P & H 3 Ton OET Crane, 3 motor, 115V D.C., outdoor type, 45' lift with reel for magnet or bucket service.

## ELECTRIC MELTING FURNACES

Detroit Electric 1500#—Kuhlman 13200 volt transformer complete with controls.
Detroit Electric 350#—Kuhlman 13200 volt transformer and controls.
Detroit 350#-750# shells 2300V Primary. Complete with controls.

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Stroman 300-400# hand tilt oil-gas.
Eclipse 100# RB stationary gas.
Stroman 350#.
Fisher 1000# BBI Manual Nose Pour.
Lindberg 500# ASM 600.

## GRINDERS, SNAGGING

2—Hammond 10 WRI D. E. Snag. 20" dia. wheels, 10 HP 220/440 v motors, variable speed drives.
1—3" x 24" U.S. #65, 20 HP 220/440V.
1—7½ HP Hammond D. E. Snag Grinder.

## GRINDERS, SWING FRAME

1—3" x 24" x 12" Marschke, 20 HP.
1—3" x 24" x 12" U.S. 15 HP.
1—2½" x 20" x 6" U.S., 10 H.P.

## HOT METAL CARRIERS

3—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers.

## LADLES

2000# Whiting Jr. & Car.
5000# Modern Geared.

## MOLDING MACHINES

**Jolt Squeezers:**
2—Milwaukee 103-11 Staty. Jolt Squeezers, 13½" x 20" table.
7—Champion JS10P Portable Jolt Squeeze molding machine, 18" x 21" table.
1—Osborn 275J.
1—Taccone Model TD4, high production diaphragm molding machine.

**Jolt Squeeze Pin Lifts:**
6—712 PJ Osborn, 18" x 28" table.

## ROLLOVERS

1—Herman 4000# Series 30" x 60" table.
1—Herman 3000# Series 40" x 84" table, special slotted table.
1—Herman 1500# Series 20" x 36" table.
2—Herman 750# Series 20" x 30" table.
2—Herman 750# Series 20" x 24" table.
3—SPO Model 9032.
1—Milwaukee 217, 22" x 42" table.
2—International Type G, Portable, 20" x 8" draw.
3—Tabor Portable Rollover 30".
Johnston & Jennings 1020-44 x 44 max. Flask Size.
Osborn #405 20" x 60" table.

## PIN LIFT PUSHOFFS

1—Champion Pin Pushoff 28" x 42" table 10" draw.
2—Milwaukee 620 ND-20" x 24" table.

## MULLERS

Simpson #2 Unit drive
#70 B & P modern cross head, rebuilt.

## OVERHEAD TROLLEY CONVEYORS

2000' Jervis B. Webb & Link Belt 678 chain, 4 D.C. motor drive and MG set.

## POURING DEVICES

3—Pouring devices, Whiting 500#.

## SHAKEOUTS

Link Belt 5' x 10'—7½ HP motor.

## STRAIGHTENING PRESS

150 Ton Dual Ram Dennison C Frame Hydraulic, 30" x 108" table.
50 Ton Oil Gear C Frame Hydraulic, 30" x 40" table.

## TUMBLING BARRELS

3—Royersford 42' x 72' Roller Bearing, Chain Drive.
1—Sly Square 42 x 42 x 64.
1—Sly 42" Dia. x 56".

## WIRE STRAIGHTENERS

Climax 2A

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  2—Size S 2000# per hour
3—Detroit Electric Furnaces—350# & 750# per hour
8 Station Newaygo Molders Hopper Line—53′ overhead belt
2—20″ x 22′ Spill Sand Conveyors w/hoppers
4—Simplicity 3 x 5 Shakeouts
1—20″ x 125′ return Sand Conveyor
1—16″ Bucket Elevator 32′ centers
1—16″ Bucket Elevator 28′ centers
1—16″ Bucket Elevator 25′ centers
1—18″ x 125′ Flat Belt Conveyor
2—50 Ton Sand Hoppers
1—Link Belt 3′ x 8′ Double Deck Screen
Magnetic Pulley

SIMPSON 3K Muller, cap. 3000# batches, w/skip, air operated double discharge, Wheelco temperature recorder, dust hood, air operated bond hopper, cooling fan, New 1955.

Newaygo Aerator
Lowden Electrified Pouring System (New Nov. 1954) Cost $87,000 552 feet-electrified rail switches
9—Yale Motoveyors—2 ton capacity
3—6000# Industrial Ladles geared covered
8—2125# Industrial Ladles geared covered
10—Ladle Heaters
3—Wheelabrators
  1—48″ x 48″ with loader
  1—36″ x 42″ w/bucket loader
  1—20″ x 27″—rubber belt type
1—36″ x 72″ Whiting Tumbling Mill
1—85M. Milwaukee Sprue Cutter
1—Besley 226 Double End Disc Grinder 30″ x 2″ x 14″
1—Besley #8 Single End Disc Grinder—20″ wheel
1—Gardner 122 Single End Disc Grinder—20″ wheel
7—Cincinnati #2 Centerless Grinders
2—Cincinnati #3 Centerless Grinders
3—Feedall Feeders
4—Osborn 712 PV Vibra Squeeze Double Swinging Head Machines—6″ pin lift
1—Osborn 716 PV Single Swing Head
2—Tabor 12″ Cylinder Pin Lifts
3000—12″ x 18″ x 3″ Sterling flasks
Ingersoll Rand 75 HP Synchronous Compressor
2—Parsons Dust Collectors—45,000 cfm and 20,000 cfm
50—Electric Hoists—500# to 5 ton—Yale and Budgit makes
10—Fairbanks Platform Dial Type Scales—1000# to 6250# includes
  3—weigh count scales up to 3200#
5—Clark Lift Trucks—4000# & 5000# cap.
2—G.M.C. 1955 Trucks
Sand Laboratory
Optical Pyrometers—L. & N. and Pyro

Arlin Automatic Rockwell Tester Model 823 for automatic production testing of small parts up to 1¼″ diameter—Cost 1955 $14,000.

2—South Bend 14½″—16″ Tool Room Lathes
#2H Plain Milwaukee Mill
24″ Cincinnati B.G. Shaper
Delta Toolmakers Grinder
L. & N. Vapo Carb Heat Treating Furnace—automatic controls—3.7 KW—1600°
5—Wilson Setomatic Rockwell Testers
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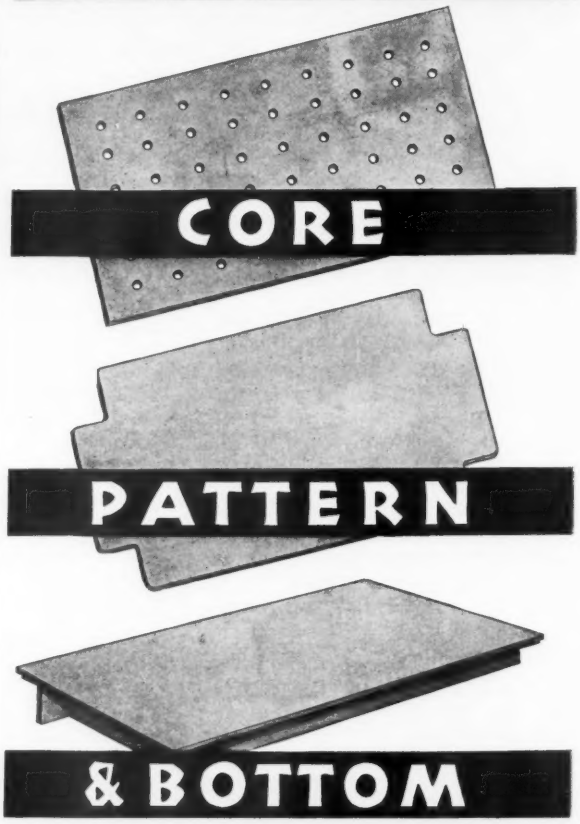


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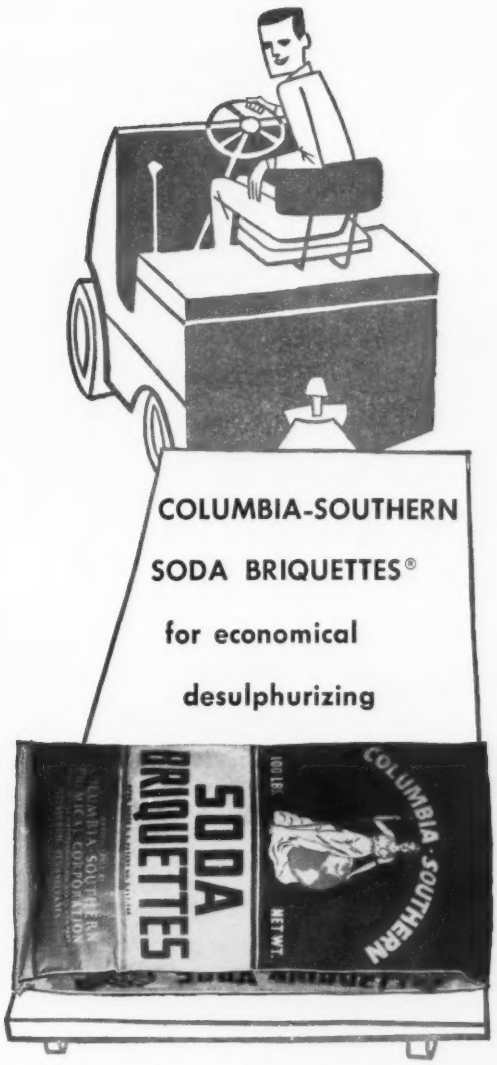


Time and labor are important factors in desulphurizing and cleansing iron as is true in every other Blast Furnace and Foundry operation.

Columbia-Southern Soda Briquettes act fast because their pellet shape, about the size of a walnut, exposes a maximum of surface area for contact with the iron. With fewer man-hours required, production can be accelerated while labor costs are actually reduced.

There are no dusting losses with these briquettes. Working conditions are improved and waste is eliminated. They always hit the mark. You can always depend on fast, efficient results.

Order your supply today by name "Columbia-Southern Soda Briquettes." Packed in 100 lb. paper bags, they are easy to handle, easy to store, and easy to transport.

**COLUMBIA-SOUTHERN CHEMICAL CORPORATION**
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
ONE GATEWAY CENTER · PITTSBURGH 22 · PENNSYLVANIA

DISTRICT OFFICES: Boston • Charlotte • Chicago • Cincinnati • Cleveland Dallas • Houston • Minneapolis • New Orleans • New York • Philadelphia Pittsburgh • St. Louis • San Francisco

IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division

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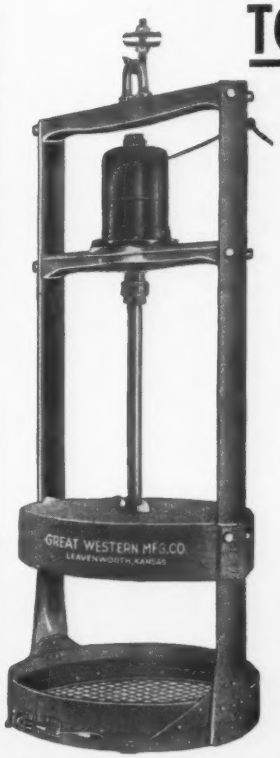
# The RIGHT Size . . . and TYPE For Every TOUGH JOB

## COMBS GYRATORY RIDDLES




**TYPE "CR".** Complete price $350.00 24" dia. round sieve. Sifts, fluffs, mixes, aerates sand. Height 4'6", weight 250 lbs., 1/3 H.P. enclosed motor. Does work of 20 men.

**Type "V",** 20" Sieve, price $275.00. Does the work of 10 men. Screens sand, Fine, Medium, and Coarse. 20" dia. sieve with special clamp for 5-second changes. 4'6" high, weight 100 lbs., fully-enclosed 1/6 H.P. motor. Also available in Giant V-5 with 36" sieve for triple capacity. Will do the work of 30 men. Price $495.00.

**PROMPT DELIVERY from your Foundry Supply House**

**TYPE "HL".** Price $250.00 complete, less sieves. Laboratory model especially designed for laboratory sand control fitted with 1/6 H.P. enclosed motor.

**TYPE "CS".** Complete price $360.00. 24" square sieve. A continuous operation sieve. Requires no dumping, as refuse is ejected off to one side. Height 4'10", weight 295 lbs., 1/3 H.P. enclosed motor. Does work of 20 men.

# GREAT WESTERN MFG. CO.

**LEAVENWORTH, KANSAS** **Phone: MU-2291**

Next Page Circle 773→

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# WHICH FOUNDRY POURS MORE METAL?

*300 molds on their way to the shake-out at Otis Elevator, Yonkers, N. Y. MODERN cranes, monorail, pouring devices and ladles are synchronized for fast, high-production pouring.*

*Model "E" Pouring Devices, 14" covered, tapered ladles, 19" distributing ladle and four, trolley type cranes pour 8 tons of gray iron, per hour, at Barclay Foundry, Milwaukee. Castings are supplied to machine tool builders and auto manufacturers.*

## Both Foundries are MODERN EQUIPPED!

and on a man-per-hour basis both foundries are pouring approximately the same volume of metal.

At the large Otis Elevator foundry, Yonkers, New York the MODERN Pouring Devices operate on MODERN trolley type cranes. Molds, when poured, move on roller conveyors to the shake-out.

At the smaller, Barclay Foundry, Milwaukee, two tons of metal, per man hour are poured with each Pouring Device.

Both foundries are saving the MODERN way — SAVING time . . . SAVING manpower and SAVING every possible pound of pay-metal.

Working hand in hand with practical foundrymen, MODERN engineers have proved, in more than 40 years of service, numerous types of charging, melting and pouring systems for ferrous and non-ferrous foundries — LARGE AND SMALL! We'd like to plan with you, too.

If your problem calls for much special engineering, write it up for a full and free discussion by our lay-out engineers. If you already know your requirements the coupon can be used for obtaining the standard, FREE literature . . .

MODERN

**MODERN EQUIPMENT COMPANY**
Port Washington, Wisconsin

**MODERN EQUIPMENT CO., Dept. F-6, Port Washington, Wis.**

- ☐ Mail new catalog on cupolas and chargers, 147-C.
- ☐ Mail catalog on ladles and pouring devices, P-152-A.
- ☐ Ask a representative to call.

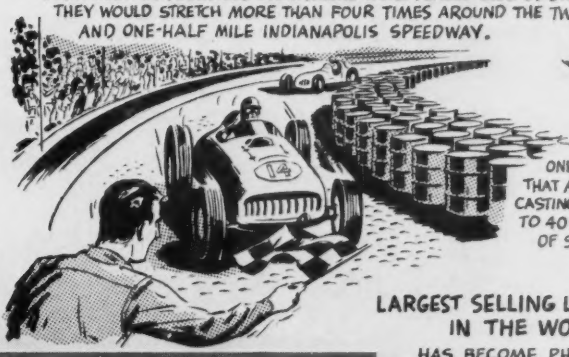
COMPANY .....
STREET ..... ZONE ..... BOX .....
CITY ..... STATE .....
MY NAME .....

# "Facing" Facts

FROM STEVENS FACING DEPARTMENT

## FOUR TIMES AROUND THE INDIANAPOLIS SPEEDWAY

IF DRUMS OF STEVENS LIQUID PARTING THAT HAVE BEEN USED BY FOUNDRIES EVERYWHERE WERE PLACED SIDE-BY-SIDE THEY WOULD STRETCH MORE THAN FOUR TIMES AROUND THE TWO AND ONE-HALF MILE INDIANAPOLIS SPEEDWAY.



## NO DUST FOR MOLDERS TO BREATHE

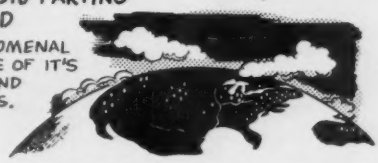
MOLDERS USING STEVENS LIQUID PARTING SAVE TIME IN DUSTING DRY PARTING ON EVERY MOLD. IT ELIMINATES THE DUSTY AIR AROUND MOLDERS... KEEPS BREATHING ZONE CLEAN AND FRESH.

## GET 40 MOLDS FROM ONE APPLICATION

ONE LARGE MIDWEST FOUNDRY THAT AVERAGES 1,200 TONS OF CASTINGS PER MONTH REPORTS UP TO 40 MOLDS FROM ONE APPLICATION OF STEVENS LIQUID PARTING.

## LARGEST SELLING LIQUID PARTING IN THE WORLD

HAS BECOME PHENOMENAL "BEST-SELLER" BECAUSE OF IT'S GREAT ECONOMY AND MANY VARIED USES.



# FOR ECONOMY YOU CAN'T BEAT. . STEVENS LIQUID PARTING

In the Stevens files we have many testimonials from foundries which state they have made up to 60 molds from a single application of Stevens Liquid Parting. We have hundreds of reports of 25 to 50 molds for a single application. That's positive proof of its economy. And it is one of the important reasons why Stevens Liquid Parting is the largest selling liquid parting in the world today.

Consider these additional features: Patterns are left clean, with no adhering sand . . . Molds always give smooth castings because sand separates cleanly . . . Molders save time and increase production since, unlike dry partings, it is not necessary to shake parting on the pattern for each mold . . . It eliminates any need for heating patterns or plates . . . There is no parting dust in the molder's breathing zone.

If you have never tried this great foundry item be sure to make an early test in your own plant soon. Call your Stevens Sales Representative or write direct to Frederic B. Stevens, Inc., Detroit 16, Michigan.

## WHAT USERS SAY:

**WE TRIED MANY OTHER BRANDS**

"After trying several other liquid partings, we tried the Stevens product and must admit its superiority to all others."

**NO STICKING IN CORE BOXES**

"Since using Stevens Liquid Parting there is no sticking in the core boxes, and they have taken on a 'burnished' appearance. Results are very satisfactory."

**SOLVED OUR DIFFICULT CASTING JOB**

"Stevens Liquid Parting enabled us to solve a difficult casting job of fins for an air cooled internal combustion engine."

**COST IS NEGLIGIBLE**

"The cost of Stevens Liquid Parting is negligible. On 625 tons of castings our parting costs were $60.00 or about 10c per ton of casting."

***BRANCHES:*** **BUFFALO • CLEVELAND • INDIANAPOLIS • NEW HAVEN**

FOUNDRY FACINGS | GRINDING OPERATIONS | BLAST FINISHING | BARREL TUMBLING | METAL CLEANING | POLISHING & BUFFING | AUTOMATIC FINISHING | AUTOMATIC PLATING | METAL RECLAMATION

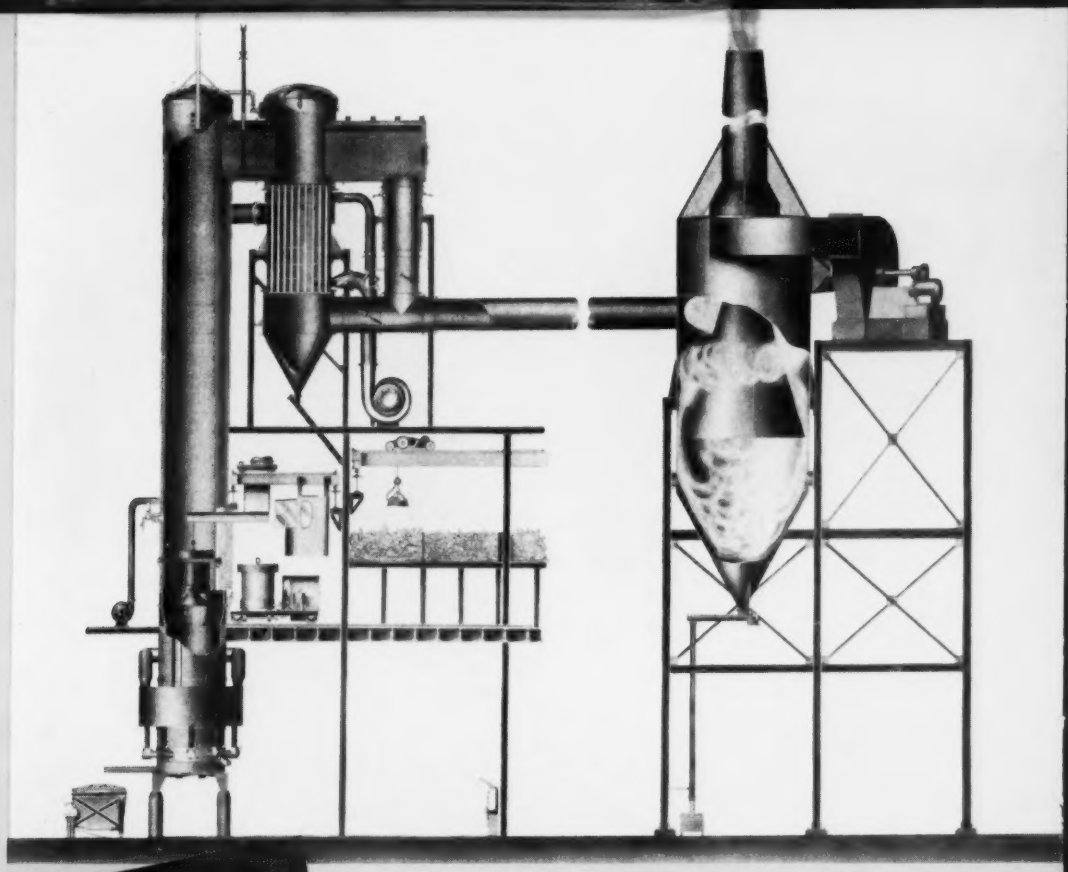
**Metal Finishing equipment and supplies from castings or stampings to finished product**

FREDERIC B. STEVENS INCORPORATED

EVERYTHING FOR A FOUNDRY

DETROIT 16, MICHIGAN

*Circle 552 on Inquiry Card—Page 51*



# BARTLETT-SNOW
CLEVELAND 5, OHIO

Grindle DIVISION

## *Hot Blast Systems*
## FOR CUPOLAS

**Also Cupolas and Cupola Charging Systems; Cupola Blowers; Metal Melting Furnaces and Accessories, Dust, Fume and Smoke Control Equipment; Duplex Melting Systems; Jib Cranes; Ladles; Transfer Cars, etc.**

Grindle Division Hot Blast Systems increase daily output of cupolas up to 22%;— save about 20% of the coke;— raise melting temperatures of the metal;— assure closer control of the iron, and improved machinability of the castings;— cut cupola maintenance and provide many other advantages.

We offer two systems; the Grindle "closed" recuperative system (illustrated above) that recovers heat from the hot exhaust gases, and can be connected easily to a Grindle dry type "Vortex" dust, smoke and fume control unit. Also the Todd, oil or gas fired, packaged, counter-flow, "Thermo-Heater" fitted with U-tubes enclosed in an insulated refractory lined steel housing.

Both systems are proven in service, fully controlled and completely automatic. Temperatures to 600° F. or more. Any C.F.M. required. Furnished completely erected and ready to operate if desired. Will repay their entire cost from the savings they'll make.

***We invite your inquiries which will have the prompt attention of our experienced cupola engineers.***

## THE C. O. BARTLETT & SNOW COMPANY

***Designers, Engineers, Fabricators and Erectors of Foundry Equipment***
***From Metal Receiving Yard to Shipment of Finished Castings***

HOME OFFICE—CLEVELAND 5, OHIO • NEW YORK • CHICAGO • DETROIT • BUFFALO • PHILADELPHIA